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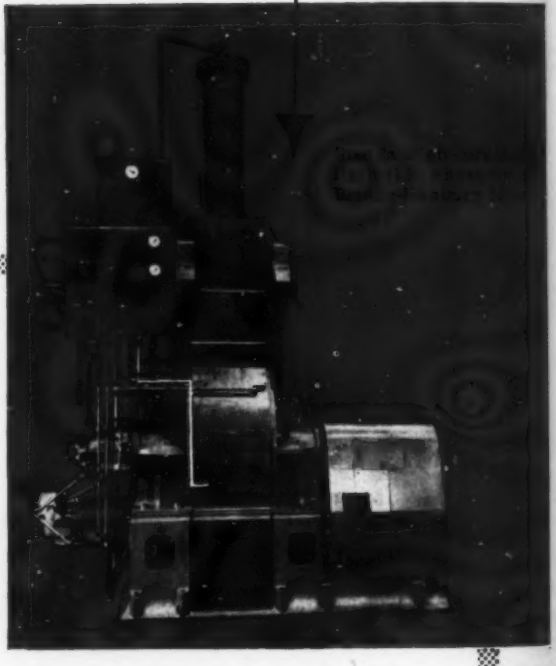

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Rubber Journal and International Plastics

Volume 137 **Price 1s. Post free 1s. 4d.** **No. 17**

IN ITS 76th YEAR

December 5 1959

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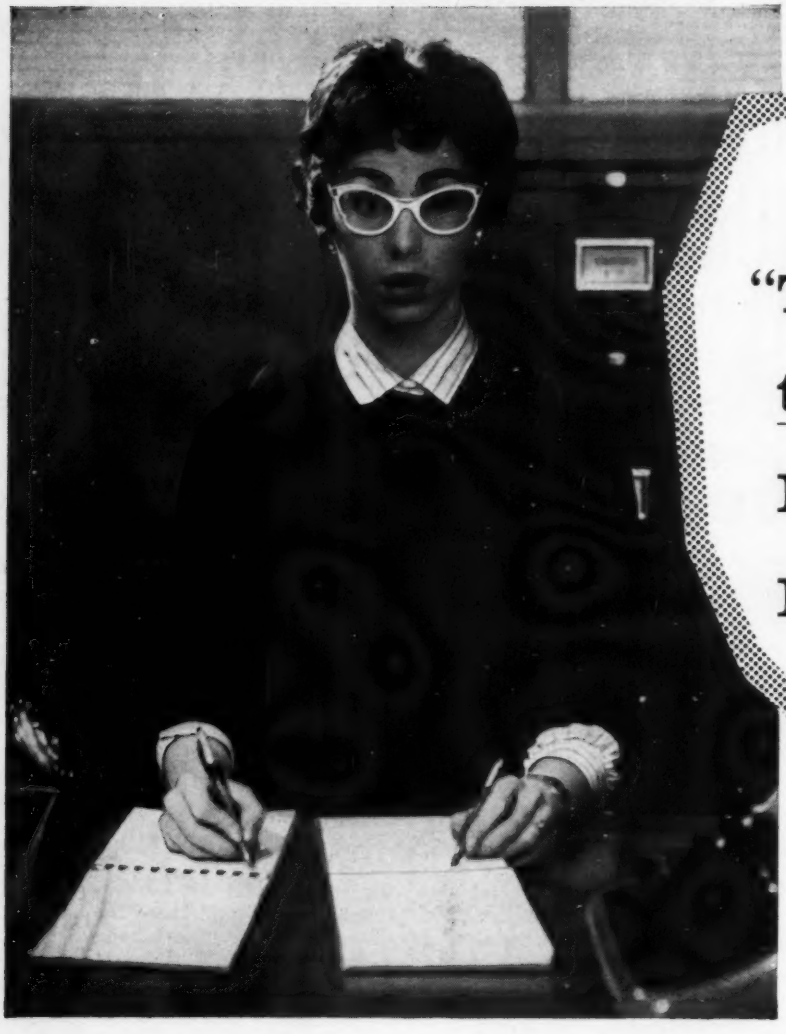

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NOTES of the WEEK

Trade Fairs

THE organization of trade fairs nowadays has become almost an industry. Their increasing frequence and size demonstrates, for one thing, the importance of display in the art of selling. But the modern trade fair is very much more than merely a display of goods. It is, as pointed out in *Barclays Bank Review* for November, a clearing house for technical information and an aid to the promotion of international prestige. The *Review* goes on to say that it is impossible to estimate the value of orders obtained from trade fairs but there is no doubt that they do result in substantial business both directly and indirectly from associated shop displays and follow-up enquiries. The *Review* notes that the growing number and complexity of products is leading to the development of specialized international trade fairs each covering a limited range of products. Buyers and sellers from all over the world can meet in an atmosphere in which technical knowledge is freely available and in which problems can be discussed to their mutual advantage. Specialized fairs tend to develop parallel with the growth of an industry, or to provide a more comprehensive display of a section of an industry. Incidentally, an interesting development in trade fairs is expected next year. This is 'Permindex,' a permanent industrial exhibition, which is to be held near Rome. Here it is intended to arrange the exhibits by category rather than by country of origin as it is thought that this will benefit buyers; another feature will be that only goods which can be delivered quite quickly will be displayed. Several British firms have already shown an interest in this project which can provide a permanent but changing shop window in which to display British goods to the world.

Young Science

ANNUAL 'fairs' at which boys and girls show exhibits, demonstrations and collections which they have prepared outside school hours as an extension of their interest in various branches of pure and applied science, already well developed in the USA, are now becoming popular in Canada. Last month the formation of the Canadian Science Fairs Council was announced in Ottawa. Dr Henri Favre, chairman of the new Council's steering committee and head of the Department of Chemistry, University of Montreal, pointed out in announcing the scheme that 'the science fair movement has important educational and scientific implications for the individual student, the school, the community and the nation. Youth, with native curiosity and eagerness to explore the unfamiliar and the unknown, has always sought opportunities for self-expression and recognition. The Canadian Science Fairs Council aims to encourage students to use their interests and skills in science, towards recognition not related to physical prowess or examination marks. This Council represents the first concerted action by the sponsoring groups in the field of education.' The Canadian Science Fairs Council is a non-profit organization. Its organizational committee comprises representatives of the Chemical Institute of Canada, whose Ottawa office houses for the time the headquarters of the new Council, the Engineering Institute of Canada, Canadian Education Association, Canadian Teachers' Federation, Canadian Conference on Education, Geological Association of Canada, Agricultural Institute of Canada, Canadian Universities Foundation and the Canadian Association of Physicists. This combination of wide ranging interests is a good indication of the importance attached to what is clearly an excellent and useful idea. One which must, surely, result in really substantial mutual advantage to industry and youth.

Nomenclature

A RECOMMENDATION to the British Standards Institution that in all future British Standards the term 'polythene' should be used is being made by the British Plastics Federation. It is further suggested that on the first occasion of its use in any British Standard a footnote should be inserted to the effect that 'polyethylene' is an equivalent term. This recommendation resulted from a Council meeting of the British Plastics Federation held last month at which use of the two terms was discussed. The BPF states that it now considers 'polythene' and 'polyethylene' to be equivalent terms, but adds that for the sake of administrative convenience it will continue to use 'polythene' with a footnote to the effect that 'polyethylene' is equivalent. This is a good and sensible lead, although it will not prevent argument, and it is to be hoped that the BSI will accept the recommendation.

NEWS *Briefs*

DUTCH PHENOL PLANT—METAL BOX FACTORY
GHENT PLASTICS EXHIBITION—ITALIAN
FOR CHINA—E. GERMAN PLASTICS INDUSTRY

●**France** — French tyre production totalled 23,500 tons in October against 22,430 in September and 22,440 in October 1958. Exports reached 4,938 against 3,503 and 4,149, respectively, while imports totalled 327 against 518 and 610 respectively.

●**Israel**—500 tons of polyester resin a year can now be made in Israel, according to Zvi Zur, the engineer heading the Machteshim Chemical Works Ltd., in Beersheba, where the material is manufactured. The plant's next step will be to find markets abroad, mainly in Africa and Asia.

●**United Kingdom**—More than 100lb. of rubber parts exclusive of tyres and tubes are being used on the average motor car being manufactured in the United States, it was stated in Coventry recently at a meeting of motor car manufacturers sponsored by Du Pont Company (United Kingdom) Ltd. The talk was given by Richard Malcolmson, motor car specialist and supervisor of the Detroit, Michigan, office of Du Pont's Elastomer Chemicals Department. Mr Malcolmson explained that the 100lb. of weight was made up of more than 500 separate parts.

●**The Netherlands**—AKU rayon industry of Arnhem and HKI rayon industry of Breda have announced that they plan to double HKI's output of transparent cellulose sheet. AKU own the majority of HKI's share capital.

●**East Germany**—The Soviet newspaper, *Industrial and Economic Gazette*, has published an article by German economist Inge Hemmerling, according to which East Germany and the USSR recently drew up a broad programme for the development of the chemical industry. Thanks to Soviet assistance, East Germany is now able to make rapid progress in developing the production of artificial fibres and plastics on the basis of petroleum chemistry. The USSR has already supplied East Germany with the blueprints for an oil-processing combine on the Oder. East Germany, in its turn, has supplied the USSR with information regarding vacuum crystallization plant which has resulted in a saving of about 4 million roubles. The USSR has successfully applied the East German experience on the production of methyl chloride and dimethylsulphate, resulting in a saving of about 7 million roubles.

●**United States**—High speed jet aircraft tyres, made entirely with polyisoprene rubber and capable of withstanding landing speeds up to 250 mph, have passed rigid durability tests which qualify the synthetic rubber for jet aircraft service. This was stated in Atlantic City by a Goodyear Research technician.

●**Italy**—Ente Nationale Idrocarburi (ENI) has announced in Rome that it has contracted to supply Mainland China with 10,000 tons of synthetic rubber manufactured by the Azienda Nazianale Idrocarburi (ANIC) plant, at Ravenna.

●**Japan** — Domestic consumption of crude rubber in August totalled 12,890 tons, a decrease of 110 tons from 13,000 tons in July, according to the Japanese Rubber Importers' Association.

●**The Netherlands** — The N.V. Koninklijke Zwavelzuurfabrieken v/h Ketjen is to build a new factory to produce phenol. Initial capacity will be two or three thousand tons a year, which the company will consume itself, but capacity may be doubled or even trebled later. Building costs are estimated at fl.10m. to be financed from the company's own resources.

●**United Kingdom** — Work starts shortly on a new plastics factory at Speke, Liverpool, for the Metal Box Co. Ltd. The £325,000 contract has been awarded to Holland and Hannen and Cubitts (North West) Ltd. Due for completion in the autumn of 1960, the single storey factory will measure 270ft. by 250ft. A two-storey office block adjoins the plant.

●**Belgium**—From June 18-26 1960, a plastics industry exhibition will be held in the Floralies Palace in Ghent. It will be organized in close collaboration with the Office Belge des Matières Plastiques. The organizers state that ' it is intended that the scope of Europlastica shall not be restricted to the Common Market Countries alone, but that it shall anticipate the inevitable and embrace at once as many European countries as is at present possible.' Further information may be obtained from Europlastica Secretariat, Palais des Floralies, Ghent, or Offices Belge des Matières Plastiques, Galerie du Centre, Bloc 3, Rue des Fripiers, Brussels, Belgium.

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Heat Treatment of Butyl Rubber

SOME RECOMMENDATIONS

By W. S. PENN, B.Sc.

THE heat treatment of butyl rubber in the presence of promoting agents is one of the most important developments in the rubber industry since Goodyear's classic discovery. Although the method is widely used, it is doubtful whether its practical implications are fully understood. This is indicated by the widely varying results reported, particularly on the effect of promoted heat treatment on Mooney scorch and plasticity.

The present article reviews the history of the subject, the methods commonly used today and gives recommended practices to give the best results with the safest processing. In this connexion, Elastopar (N-methyl-N, 4-dinitrosoaniline) is far safer to handle than p-dinitrosobenzene (Polyac or Vulcafor BDN) although the latter has the longest experience behind it.

Both of these promoting agents produce similar changes in butyl rubber. First, the physical properties are improved in many ways, manifested particularly by increased modulus and resilience. Second, the processing characteristics are improved, manifested by smoother extrusions and calendered sheets, better green strength and improved scorching properties.

Although the two promoting agents give similar results, the mechanism by which they are achieved appear to be different in some respects at least. These differences are not fully understood and some comment on the subject is given in the present article.

History

It has been realized for some time that heat treatment effects certain changes in a number of polymers. Patents concerning the heat treatment of natural rubber/carbon black stocks were taken out as long ago as 1938[1,2]. A further suggestion was made later that urea and benzidine act as promoting agents[3] and in 1948 the methods were applied to GR-S[4].

Heat treatment does effect improvements with natural rubber but it is offset to a large extent by simultaneous oxidative degradation. A slight increase in modulus is obtained but the method is not to be encouraged. SBR is safer than natural rubber and an increase in modulus and resilience is obtained. However, great care must be taken to avoid oxidation and only limited times and temperatures may be employed.

The classic work on the heat treatment of butyl rubber was carried out by Gessler and co-workers[5,6,7,8,9] and is reviewed below. The first work was without promoting agents, but later investigations studied these materials which included Polyac. Leeper and co-workers[10] completed the basic work with their report on Elastopar. Since their work, most developments have been a question of individual work in factories. The only real improvements have been in the proper understanding of the process and its correct application on a large scale.

Gessler's Early Work

The first work of Gessler and his co-workers was directed towards the cyclic heat treatment of a butyl rubber / carbon black masterbatch which had been previously prepared. The mix was essentially 50 parts channel black with 100 parts polymer prepared in a Banbury operating at normal temperatures. No promoting agent was employed.

The masterbatch was heated for 30 minutes in open steam at 320°F. A number of such cycles was given, whereupon curing ingredients were added and the resultant mix cured. It was found that a number of significant changes had taken place and that, in general, the changes became more marked the greater the number of cycles.

Some of the changes which took place were profound. Although the tensile strength was only increased slightly a large increase in the modulus was obtained. Abrasion resistance, electrical resistivity and resilience were all improved.

It was found that these changes only applied to channel blacks, although in the uncured state the electrical resistivity of a furnace black stock was increased from 10^7-10^{14} ohm cm. On curing, the resistivity reverted to normal. The reason for the difference was determined. Channel blacks have a surface layer of chemisorbed oxygen and furnace blacks do not. If the oxygen is removed from channel black or the surface of furnace black is oxidized, the heat reaction effect can be reversed.

It was found that if various promoting agents were used during heat treatment a response was also obtained from furnace blacks. In the experiments the carbon black masterbatch was prepared in the usual way at moderate temperatures, with the promoting agent added at the end of the cycle. The masterbatch was then subjected to cyclic heat treatment before cure.

A variety of materials were found to behave as promoting agents. These included sulphur, MBT, TMT and GMF. As little as 0.1-0.15 sulphur with HAF black gave similar results to the unpromoted heat treatment of channel black/butyl rubber combinations.

Polyac (Vulcafor BDN), a 30% mixture of p-dinitroso benzene with 70% inert filler, was found to be a very effective material. It was thought that the use of Polyac resulted in two reactions taking place in the compound. The first was the formation of polymer/polymer cross-links and the second was the formation of strong black/polymer bonds. The polymer/polymer cross-links are the part of the reaction likely to cause scorching difficulties, but the other mechanism, with the accompanying improved carbon black dispersion, is responsible for many of the advantages of the reaction.

After the work on blacks, the fine particle silicas were examined[8]. A vigorous reaction took place with these materials so that the concentration and type of promoting agent had to be carefully controlled. Suitable materials were GMF, dibenzo GMF and Polyac and in the first and last cases 0.5 parts represents the upper safe limit. Table 1[8] illustrates some of the marked changes which take place with various Hi-Sils.

TABLE 1

Property	Before heat treatment	After heat treatment
Tensile strength p.s.i.	2545	3110
Modulus at 300% ..	255	1025
Modulus at 500% ..	665	2320
Elongation at break%	800	640
$\eta f \times 10^{-6}$, poises × C.P.S.	6.35	2.34

Heat Treatment of Butyl/Silica Mixes

The proposed nature of the change is easily observed from the results in Table 1. The change in dynamic pro-

Electrical Aids in Industry

Data Sheet **No. 9**

Lighting-3

Data Sheet No. 7 dealt with some actual applications of factory lighting. Further applications are given here.

Drawing Offices

It is fair to say that in no part of a factory is good lighting more important than in the drawing office. The draughtsman's task is extremely exacting and unless the illumination is up to required standards, mistakes, loss of time and greater fatigue will result.

The essential requirements are:

High value of illumination
(*minimum of 30 foot-candles on the boards*)
Absence of shadows
Absence of reflection

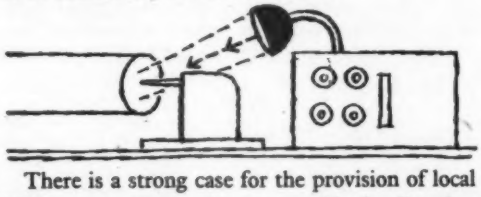
One of the major problems is the reflection of the light sources by shiny tracing paper, instruments, set-squares, etc., and particularly by the extra-hard pencil leads often used. Another problem is that caused by the shadows ahead of T-squares and by the variety of angles at which drawing boards are set.

Fluorescent lighting is particularly suitable because of its comparative freedom from shadow, its natural colour and because it can be localised with respect to drawing boards to avoid reflections while at the same time giving enough light upward and sideways to satisfy the general lighting requirements of the office.

A lighting solution which has been successfully employed for tracing is to light from beneath and through the paper which is fixed on to a translucent panel, thus eliminating the problems of shadow and reflection.

Machine Shops

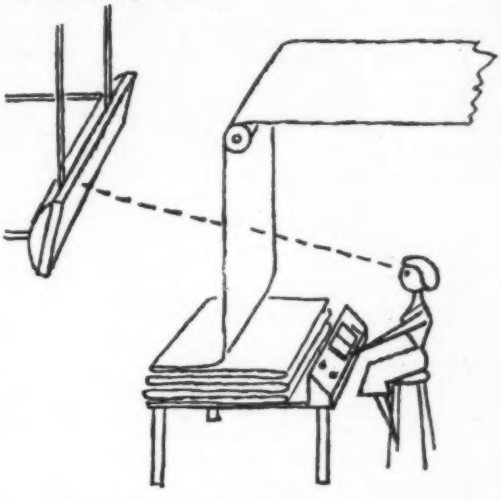
The problems of machine-shop lighting vary so widely that it is impossible to lay down rigid rules which are applicable to all types of machine. Much of the design of such lighting systems must therefore be a matter of individual application. Certain maxims, however, have proved in practice to be satisfactory in various trades.



There is a strong case for the provision of local lighting on many machines to enable the direction of light to be varied to suit the work, or to boost the illumination for fine work.

In shops employing certain machine tools, particularly circular saws, the possibility of stroboscopic effects can be avoided by splitting lamps among the phases of a three-phase supply or by using twin lamp fittings with a split-phase circuit.

Where safety goggles are used, extra illumination should be provided to compensate for the reduced light reaching the eyes.



Silhouette inspection of fabrics or profiles can often be used to advantage by placing a light source behind the material to be inspected — on the lines of the back-lighting already referred to for tracing in the drawing offices.

In general, machine-shop lighting is essentially an empirical science, based largely on a combination of general and local lighting, which offers immense scope for ingenuity.

Outside Lighting

The outside precincts of a factory are often much neglected. No special rules can be suggested for lighting these areas, but speed, efficiency and safety are all dependent on adequate outside illumination during the hours of darkness.

For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London, W.C.2. Telephone: TEMple Bar 9434.

Excellent reference books on electricity and productivity (8/6 each or 9/- post free) are available—"Lighting in Industry" is an example.

E.D.A. also have available on free loan in the United Kingdom a series of films on the industrial uses of electricity, including one on industrial lighting. Ask for a catalogue.

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Advertiser's Announcement

perties is given if measured with the Yerzley oscillograph, where η is the internal viscosity of the vulcanizate at a frequency f. The expression really describes the energy lost as heat and is inversely proportional to the resilience. In this particular case there is a considerable improvement in resilience.

In compounding butyl rubber with fine particle silicas it is necessary to add glycol or glycerol to obtain a satisfactory cure. These activators should be added before heat treatment takes place since an additional improvement in results is obtained, particularly with dibenzo GMF. A problem hitherto in compounds of this type, has been the exceptional stiffness of stocks. Heat treatment results in a particularly flexible compound.

The work described above on the heat treatment of butyl/silica mixtures, was carried out in a Banbury, by a two stage mixing process. A masterbatch was prepared with cooling water on and with the addition of dibenzo GMF late in the cycle. The masterbatch was subsequently milled in a heated Banbury, the temperature reaching 420°F. The best results were obtained with between 10 and 15 minutes of treatment.

It has subsequently been found that a two-stage mixing cycle is unnecessary. Mixes containing silica do not require as much heat treatment as those containing carbon black and an 8-12 minutes total cycle is satisfactory.

Use of Elastopar

Polyac was the principal commercial promoting agent which was used for some time. It is difficult to handle, however, for reasons to be described later, and safer products were clearly desired. Elastopar, another nitroso compound, was found to be an effective promoting agent which could be used with much less fear of scorching problems. It has 33% active chemical, with the remainder inert filler.

Leeper and co-workers[10] described the original work on Elastopar. By its use the usual improvements attributed to promoted heat treatment are obtained. At the same time it does not cause the formation of polymer/polymer cross-links so that few, if any, subsequent processing difficulties are likely to be experienced.

The best and normal way of adding Elastopar is to add the butyl rubber to the Banbury followed immediately by the promoting agent. It is then masticated with the polymer for about one minute before the black and the other ingredients are added in the usual way.

The compound employed in the original investigation contained 50 parts MPC or HAF black with 1.0 stearic acid on 100 parts Enjay Butyl 217 and it was subsequently cured by adding 5.0 zinc oxide, 1.0 MBTS, 1.0 TMT and 2.0 sulphur. The Banbury was preheated to 300°F. and to it was added the polymer and Elastopar which were mixed for one minute. The carbon black and stearic acid were added after another minute and the batch dumped after a further nine minutes. The sulphur and accelerators were added on a cool mill.

It was found that the optimum increases in properties were obtained with 1.2-1.8 parts Elastopar. With MPC the modulus at 300% increased from 1,400 psi to 1,900-2,000 psi and with HAF from 1,590 to about 2,400. In the former case the Shore hardness dropped from .67 to 60 and in the latter case from 74 to 70 which represents quite useful increases in flexibility.

The change in Mooney scorch and viscosity gave varying results. The MPC mix without Elastopar had a Mooney plasticity (ML-4/212°F.) of 95. With 0.6 Elastopar this dropped to 89 but at 1.2 and 1.8 Elastopar the figures were 94 and 102 respectively. What this means on a molecular basis is difficult to say, particularly since with the HAF black mix the picture was different. Here, with the Elastopar concentrations of 0.0, 0.6, 1.2 and 1.8, the Mooney plasticity figures were 93, 85, 90 and 75 respectively. These changes are too much for experimental error and represent a considerable change in the molecular structure, possibly extensive polymer/carbon black linkages and very good dispersion. This question of change in Mooney value is considered later. It may also be noted that the scorch value improved slightly (3-4 minutes) for both MPC and HAF.

The effectiveness of the reaction varies with the Banbury temperature. Optimum increase of modulus and improvement in hysteresis was obtained at 255°F. At this temperature the effective change in properties occurred in about three minutes.

The work so far described has been confined to carbon blacks and fine particle silicas. Soft and hard clays are also used extensively, particularly in the cable industry, and it is important to see if promoting agents react with them also.

The simple answer is that they do, both by static heating and dynamic heating in the Banbury. Table 2 shows some changes which took place with various clays in the following mix: Enjay butyl 218, 100; stearic acid, 1; Elastopars, 0 or 1.5; clay, 135; zinc oxide, 4; sulphur, 2; tellurac, 2.5; MBT, 1.2. For the mixes not containing Elastopar, the dump temperature was 260°F.

With the heat treated stocks the following Banbury cycle was employed: 0 minute, add butyl rubber; 1 minute, add ½ filler, stearic acid and Elastopar; 3 minutes, add remainder of filler; 9 minutes, dump at 300°F.

The sulphur and accelerators were subsequently added on a cold mill.

These results are of considerable interest. All the clays react but to varying degrees and in different ways. The tensile strength drops in all cases except with the ECR clay. There is a considerable increase in modulus in all cases and reduction in elongation which was also obtained with blacks. On the other hand, the hardness does not appear to be reduced, as it is with blacks, and with the ECR clay it is actually increased several points. The scorch resistance is improved.

With regard to specific fillers the hard clays appear to respond to heat treatment more than the others. The increase in modulus is outstanding. The calcined clay (Whitetex or ECR) is also rather different from the others, no doubt accounted for by the treatment it received. In Table 2, no named clays have been given. This is because they vary quite considerably between themselves and it is thought best to confine a comparison to the general results obtained with classes of fillers.

Power Consumption

When mixing butyl compounds by the heat promotion technique it is important to have an ammeter or wattmeter coupled to the Banbury motor. This serves two functions. First it is possible to see whether the required reaction has taken place and second it is possible to determine

TABLE 2

Type of Clay	Hard clay		Soft clay		Calcined clay	
Elastopar	No	Yes	No	Yes	No	Yes
Mooney Viscosity ML 4 at 212° F.	86	122	95	112	134	159
Tensile Strength psi	1560	1320	980	860	680	790
Modulus at 300%	410	1060	420	840	380	660
Elongation at Break %	660	460	530	360	500	320
Shore A.	66	67	66	67	67	72

Effect of Heat Treatment of Clays in Butyl Rubber Compounds

ASRC Polymer 1500
at the breakdown time
of 2 minutes
Brand A Polymer 1500
at the breakdown time of 2 minutes
Brand A Polymer 1500
at the breakdown time of 8 minutes

Report on Polymers

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whether or not the compound is scorching. This is most important in Polyac mixes.

In his early work[1], Gessler published a curve showing the change in power in kilowatts during a cycle in a 00 Banbury with heat treatment of a Polyac promoted mix. Without Polyac the power started at 10.3kW and dropped continuously until at 10 minutes it was 7.5kW. The compound with Polyac, in the Banbury at 400°F., gave a power peak of 10.7kW after about two minutes and this then dropped to 7.5 at 10 minutes. A similar curve was obtained during the mixing of a Hi-Sil compound.

The type of power curve is different from that obtained in practice (below). This is because in the Gessler experiments a previously mixed masterbatch was added to the Banbury. In modern procedures the promoter is added with, or just before the principal ingredients.

Ammeter readings taken with the mix given below are given in Figs. 1-3. All results are for a No. 3A Banbury. Fig. 1 shows the readings where the compound was discharged after 10 minutes, Fig. 2 after 12 minutes (both at 325°F.) and Fig. 3 for the same compound containing Elastopar with the reaction at 285°F.: Enjay butyl 215, 100; zinc oxide, 5; stearic acid, 3; Whitetex, 140; paraffin wax, 5; Tellurac, 1.5; MBTS, 1.5; ZDC, 2; sulphur, 1.5; Elastopar, 1 (or Polyac 0.5).

In these compounds the polymer was added to the Banbury, followed by the promoter after one minute, and the remainder of compounding ingredients (except sulphur and accelerators) after three minutes. In Fig. 1 there is a drop in power requirements as the polymer is masticated. When the Polyac is added, however, there is a 'bump' in the power requirements, presumably as some reaction takes place, although theoretically it takes much longer than the three minutes required on the curve. The curve then rises steeply as the compound 'picks up' in the Banbury. It should have started to drop after 10 minutes and since it did not, partial scorching had occurred. This was because lead peroxide was added, experimentally, and acted as a subsidiary promoting agent.

In Fig. 2, a similar reaction occurs but the curve begins to drop after 7-8 minutes. It should drop considerably more than this but some scorching (by polymer/polymer cross-linking) had developed and if the compound had been kept in the Banbury the curve would have risen steeply.

The type or curve which should be obtained is given in Fig. 3. Here there is a continual drop in power requirements after the 'compound' peak is reached. The compound may be regarded as completely mixed after about two minutes of the downward curve, *i.e.* in Fig. 3 the compound may be dumped after 10 minutes. The time of dumping is best related to the power requirements which may be incorporated in the technical instruction. If the downward curve levels off quickly, it may be assumed that scorching is taking place.

Practical Use of Polyac

The original recommendations for the use of Polyac were to prepare the filler masterbatch in a cool Banbury and add the Polyac at the end of the cycle.

This masterbatch was then to be added to a Banbury, previously heated to about 400°F., and heat treated for 20 minutes. With the two Banbury

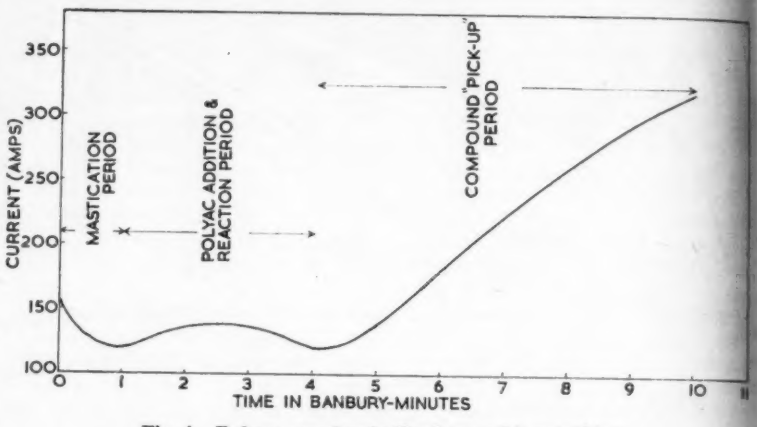

Fig. 1. Polyac reaction in Banbury with scorching

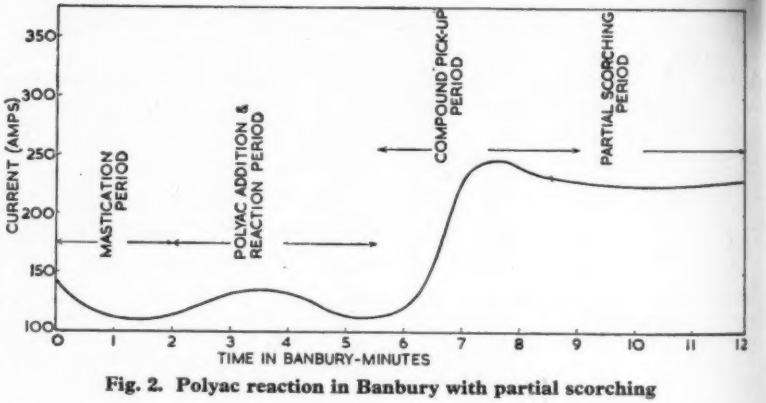

Fig. 2. Polyac reaction in Banbury with partial scorching

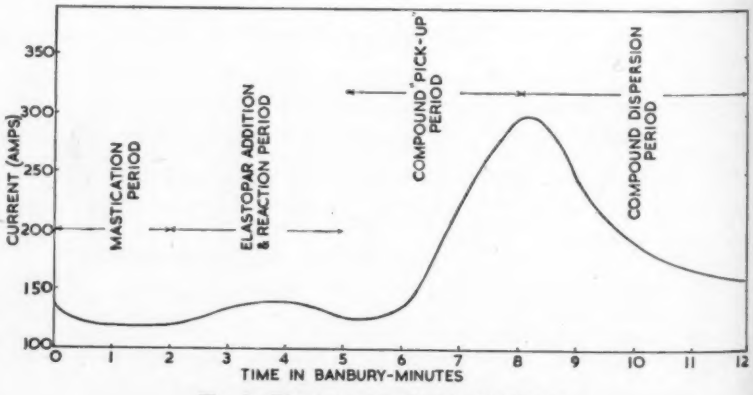

Fig. 3. Elastopar reaction in Banbury

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cycles this would give at least 30 minutes' mixing time, a prohibitive figure for modern times. About 0.5 parts Polyac was a common figure.

In view of the economic objections to the above, it was soon discovered that the reaction could be carried out in much shorter times and simultaneously with the mixing of the masterbatch. A typical Banbury schedule, taken from many in the literature, is as follows:

0 Minute ..	Add butyl
½ Minute ..	Add ½ filler, Polyac
2 Minutes..	Ram down
3 Minutes..	Remainder of filler, zinc oxide and stearic acid
4-11 Minutes	Full ram. Temperature 300°—350°
12 Minutes	Dump at 350°F.

It is such schedules as this which have given very variable results. If the stock is mixed correctly a slight increase in Mooney plasticity and an improvement in Mooney scorch will be obtained. If this is not so, the compound is partly scorched.

Much of the work reported in the literature was carried out in small laboratory Banbury mixers. Such work does not necessarily bear much relationship to factory Banbury mixers and it may certainly account for differences between observers. Bearing this in mind, the above schedule is not satisfactory. The present recommendation is that Polyac needs 15-20 minutes at 350°F.-400°F. for full reaction. If this is not carried out, even if the compound does not scorch in the Banbury, it may during subsequent processes. In any case it will be very sensitive to heat treatment and there will be no margin of safety, particularly with black stocks.

If after Banbury mixing a compound with Polyac, there is any difficulty with banding on the mill, it is a sure sign that partial scorching has taken place. The compound will 'shred' and need to be handled very carefully before a reasonable band is obtained.

Practical Use of Elastopar

A typical modern mixing cycle for a butyl mix containing Elastopar is as follows: 0 minute, add butyl; 1 minute, add ½ filler, stearic acid and Elastopar; 3 minutes, add remainder of filler; 4-9 minutes, mix with ram down and temperature at 275°F.; 10 minutes, dump at 275°F.

With such a mixing cycle, whether black or mineral fillers are used, there is no danger of scorching. The Polyac causes cross-linking of polymer chains which adds a certain amount of 'gel' structure to the compound. The Elastopar causes little, if any, cross-linking but creates strong filler/polymer bonds and the filler dispersion is considerably improved. It is these two features which give the marked increase in modulus and other characteristics of Elastopar promoted stocks.

The result on the green stock, as distinct from the vulcanized compound, is important. There is likely to be an increase in Mooney viscosity to the extent of 10%-20% although there are cases where no change is obtained. The Mooney scorch value will decrease (improve) and in the compound used for Table 2, the MS value at 250°F. was improved from 13 to 20, comparing a compound mixed cold without Elastopar with one mixed hot with Elastopar. Unless this improvement is obtained, the correct reaction has not taken place.

After dumping from the Banbury the above compound bands readily on the mill. It gives a smooth sheet which is most satisfactory for extrusion purposes. The cold flow of the compound is also reduced as expected.

In all the above work the accelerators and sulphur were added on the mill and this is the wisest course to follow. Although Elastopar is considerably safer than Polyac, it will still scorch so that the usual processing precautions must be taken.

Order of Addition of Ingredients

The order in which ingredients are added to the compound during mixing is important. Zinc oxide and stearic acid may be added at any time without causing difficulty.

The addition of curing ingredients and materials which could act as subsidiary promoting agents are the ones where special care has to be taken. If sulphur or GMF (or dibenzo GMF) are added during the heat treatment process scorching will result. The lead oxides are also likely to cause trouble. All of these ingredients should be subsequently added on a cold mill.

MBTS accentuates the reaction while TMT makes it less effective.

Practical Recommendations

This detailed account of the promoted heat treatment of butyl rubber has been given for two reasons. First, it is a most important development and, for many purposes, butyl rubber will never be handled successfully without it. Second, there are many confusing results and recommendations in the literature which need standardizing. Based on the information given in this chapter the following procedure should be adopted in the factory for the promoted heat treatment of butyl rubber.

(1) Polyac

(*a*) The safest quantity to use is 0.1 to 0.2 phr.
(*b*) Preheat Banbury to 350°F.
(*c*) Masticate butyl for 1 minute.
(*d*) Add Polyac with early fillers.
(*e*) Heat treat for at least 15 minutes.
(*f*) Dump at least at 350°F.
(*g*) Keep control chart of power readings for any sign of scorch (by excessive cross-linking).
(*h*) If the compound does not band smoothly on the mill it is scorched.
(*i*) Use cold mill for addition of accelerators.
(*j*) Never add curing ingredients or compounds which act as subsidiary promoting agents, with the Polyac.

(2) Elastopar

(*a*) Use 1.0 phr. Higher quantities may be used with the optimum at 1.6 phr.
(*b*) Pre-heat Banbury to 275°F.
(*c*) Masticate butyl for 1 minute.
(*d*) Add Elastopar with first fillers.
(*e*) Dump after total cycle of 10 minutes at 275°F.
(*f*) Add accelerators on cool mill.

There is no doubt that the schedule with Elastopar is far simpler and safer than Polyac and is strongly recommended. Nevertheless, provided the correct procedure is adopted, it is possible to obtain, with Polyac, the type of reaction typified in Fig. 3.

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New Tyre Tread Compound

The B. F. Goodrich Company have announced a new compound for passenger tyre treads which, it said, will give a softer, quieter ride than present tyres. Goodrich is the third major rubber company to announce an improved tread compound. According to the president of the B. F. Goodrich Tyre Company, a division of B. F. Goodrich, the new tyres engulf small objects on the road and absorb road vibration to give a better ride. The company declined to elaborate on how the new compound is made except to say it was not similar to plioprene or to butyl rubber.

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FBRAM President's Dinner

SUCCESSFUL SECOND OCCASION

THE institution last year of an informal dinner given by the president of the Federation of British Rubber and Allied Manufacturers was carried on by Mr H. G. W. Chichester-Miles, chairman of the Empire Rubber Co. Ltd., when, on November 26, he was host to more than 130 members and associate members of the Federation. The organization was equal to the occasion which proved once again how valuable these events are in providing opportunities for people engaged in every aspect of the rubber industry, and those associated with it, to meet and talk things over.

After a brief and most entertaining speech, mentioning among other things the speed with which traditions can be broken, Mr Reay Geddes introduced the president.

In welcoming his guests, Mr Chichester-Miles said how very glad he was to see so many friends from all parts of the industry; members of the Federation Council, chairmen of the committees and associate members of the Federation. He would like first of all, he said, to thank Mr Stuart Covell, director of the Federation, and Miss Chenhalls for the excellent arrangements they had made for the evening.

Continuing, the president said that their industry was a vast and important one, serving, in fact, every great industry. Ahead of them, it seemed to him, was a period of much freer trade and he, for his part, welcomed competition, which would certainly increase, especially from the nations which had resuscitated themselves after the war. The rubber industry in this country would not only meet such competition on a price basis. Quality and promptness would always be of the greatest importance. Quality, he went on, meant not only good raw materials, good machinery, but good people. Those in the rubber industry in the UK could hold their own but they must make quite sure that quality was the aim of their endeavours.

Mr Chichester Miles went on to say that it was clear that during and since the last war co-operation had grown in many fields of endeavour. In this connexion, the president quoted a story of a farmer who had won many blue ribands for the corn he grew and who yet made a practice of sharing his best seeds with his neighbours. Asked how he could afford this, he replied that if he wanted to grow good corn he had to help his neighbours to grow good corn too, for the wind blew pollen from field to field. In addition, if products from his area got a bad name, that also was bad for him.

In the rubber industry, continued the president, co-operation had certainly increased and perhaps particularly so in the activities of the Federation. There were some who looked at the matter only from the point of view of what they could get out of it. Others said that what one got from it was the same as one put into it. He believed that the help one received from the Federation was greater than the sum total of what was put in by all the members. Properly supported and used, the Federation could be even greater in the future than in the past.

Among those present at the president's dinner, *left to right, below and facing page,* **were: 1. H. G. W. Chichester-Miles (president) and R. A. Sturdy (I.C.I.). 2. J. Jewel and H. D. Rippe (both of the Ship Carbon Co.), L. R. Mernagh (Firestone) and J. T. Watts (I.C.I.). 3. A. W. Hopkins (GEC) and W. E. Prior (Northern Rubber). 4. R. Northover and S. J. E. Medlicott (both of H. G. Miles Ltd.). 5. Ellice Clark (Barratt and Ellice) and C. J. G. Stanley (BPF). 6. C. Rebbeck (BTR) and H. S. Bennett (Henry A. Cole and Co.). 7. A. W. Oxer (Dunlop Footwear) and R. D. Hunt (North British Rubber). 8. B. M. Fawkes (Rubberware), H. J. Hornsby (ISR) and J. A. Killick (Ioco). 9. Charles Mason (Avon) and H. Walker (Micafine). 10. Rigby Grant (Alfred Smith) and L. A. J. Gardner (Hubron). 11. Dr W. F. Watson (RABRM). 12. N. G. Bassett Smith (Dunlop), C. Fraser (Dunlop) and E. S. H. Janes (Dunlop). 13. K. Bradshaw (David Bridge), M. Heath (Avon) and J. K. Berry (Courtaulds). 14. G. E. Godfrey (Silvertown), J. Frankenburg (Greengate and Irwell) and H. Hillier (William Warne). 15. H. Rogers (Northern Rubber) and F. M. Panzetta (Avon Spencer Moulton). 16. W. T. L. Becker (Volcrepe), S. B. Turner (Expanded Rubber) and D. E. Cameron (B.B. Chemical). 17. R. M. Geddes (Dunlop) and L. H. Williams (Shell Chemicals). 18. C. H. M. Baker (Firestone), J. C. Bennett (Henry Gardner) and C. H. Daniano. 19. L. R. Dowsett (Geigy), H. Walker (Micafine) and H. A. Daynes (Siemens Edison Swann). 20. J. Bishop (Nordac), E. Allcock (Dunlop) and G. G. Cole (BTR). 21. F. D. Wayne (Dexine), T. Brooke (Redfern's) and F. Train (John Bright Bros.). 22. L. A. Wilson (vice - chairman RTA), S. Covell (FBRAM) and A. F. Pegler (Northern Rubber)**

Asbestos Corporation

The smaller extra dividend declared by Asbestos Corp. Ltd. reflects the fact that earnings for 1959 will be down compared with last year, A. L. Penhale, president, has stated in Montreal. The company has declared an extra of 20 cents compared with 70 cents paid last year. For the full year 1959 dividends will total $1.40, consisting of four quarterly dividends of 30 cents each and an extra of 20 cents. In 1958 dividends totalled $1.75, comprising three quarterly dividends of 25 cents each, one of 30 cents and an extra of 70 cents.

Mr Penhale said the lower earnings for 1959 came as no surprise as he had predicted such an event at the company's annual meeting in April. He said he was unable at this time to say how much they would be below 1958.

VIEWS and REVIEWS

Effects of Metal Contaminants on Ageing

'THE Ageing of Rubber; Effect of Metal Contamination,' was the title of a paper read before a meeting held by the Manchester Section on March 24 1958, by B. N. Leyland and R. L. Stafford (Imperial Chemical Industries Ltd., Dyestuffs Division, Polymer and Chemicals Service Dept.), and reprinted from *Transactions of the Institution of the Rubber Industry*, Vol. 35, No. 2, 1959, pp. 25-44.

It will be noted that more than a year has elapsed since this important paper was read, which seems a pity, but delays of this kind seem almost unavoidable.

The present *Summary* is based on the authors' summary:

The oxidation of raw rubber is strongly promoted by small amounts of copper (30 to 100 ppm), especially when this is introduced as the salts of weak acids. There is evidence that these salts act as pro-oxidants, increasing the rate, but not changing the nature of the oxidative reaction. Attention has been drawn to the pro-oxidant activity of ferric stearate. Although not so active as copper in raw rubber, it could certainly be a cause of serious degradation.

The authors state that the metal-catalysed oxidation of raw rubber emphasizes the effectiveness of zinc diethyl dithiocarbamate (ZDC), and of tetramethyl thiuram disulphide (TMT) against copper contamination. It is also shown that a non-staining inhibitor, originally developed for vulcanized compounds, is effective in affording inclusive protection against both copper and iron in raw rubber.

Sulphur Cures

In sulphur cures the pro-oxidant activity of copper and iron is again manifest. . . . In these compounds ferric stearate is shown to be as potent as copper stearate in promoting degradation.

Raw Rubber and S. Cures

Although a few conventional antioxidants give fairly good protection against copper contamination in vulcanized rubber there is a need for even more powerful metal inhibitors which are also good conventional antioxidants.

The synergism of selected antioxidants with mercaptoimidazole (MBI) is demonstrated in copper-contaminated compounds leading to the design of improved inhibitors (*cf. Figs.* 12 *and* 13). Some characteristics of a non-staining inhibiting system are discussed including its effectiveness as regards raw and cured rubbers. This affords the means of conferring protection both before and after curing.

It is shown that the efficacy of such a system in vulcanized systems is not restricted to high-temperature oxidation, but that it is also effective in the region of room temperature.

Sulphurless TMT Compounds

It is remarkably interesting to hear that sulphurless TMT compounds are strikingly different in their reaction to metal contaminants. In these compounds copper stearate itself acts as a powerful antioxidant, whereas ferric stearate still remains pro-oxidant in effect.

[*Note.*—One of the most striking effects is the strongly pro-oxidant effects of ferric stearate. It was known that iron salts could under certain conditions cause trouble in cured rubber, but it was left—I believe—to Messrs Leyland and Stafford to show how strong this effect might be.]

I remember some 30 or 40 years ago using a test for iron ochres to see whether they were likely to cause trouble in a cured mix. The test was a very simple one, and consisted in shaking up with water, filtering, and testing for iron. It was surprising to find the number of specimens which were 'infected.'

From a positive angle the test was successful, but naturally, it was not guaranteed to do the job. Although I do not remember any trouble, I cannot say whether I was the 'originator' of the test, and lay no claim to priority although it did, as far as it went, the job. I apologize for this lapse into anecdotage.

Messrs Leyland and Stafford are to be congratulated on a fine piece of work, and I regret that I cannot give it more space.

Delamination

The usefulness of rubber bonded fabrics has been carried a step further by work carried out by E. G. Pole (Rubber Technical Developments Ltd.) on a pilot plant scale at RTD, to overcome the problem of delamination by making use of a heat sensitive rubber latex.

Two distinct methods of obtaining a more random fibre distribution have been developed and have found favour in industry. The first utilizes conventional carding equipment to prepare cross-laid webs, whilst the second involves aerodynamic manipulation of the fibres.

The web prepared by the former method is multi-layered, but in the second the required weight is laid down in one operation. Both methods delaminate fairly readily, and although this is not a matter of major concern for many end uses, it is in others.

Work with Charged Latex

The early work on natural rubber bonded non-woven fabrics carried out by RTD involved the use of a positively charged latex, and although this had some good points the use of a positively charged latex presents some difficulties, and therefore an alternative way of immobilizing the latex particles before drying was desirable.

Gelling Agents

A more obvious method of preventing migration of the particles is by the use of a gelling agent. There are a great many such agents which can be used, but they may

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **DR SCHIDROWITZ**

be divided into two classes. The first class may be termed external gelling agents, and includes acids and salts of multivalent metals. The objection to this method is that it involves the use of a double impregnation system, and this has various disadvantages.

The second class may be termed internal gelling agents and includes zinc ammonium salts and non-ionic polymers such as polyvinyl methyl ether and polypropylene glycols. These agents are added to the latex itself before impregnation is effected and if suitably compounded they are inactive at room temperature. When the temperature is raised, however, the agent becomes active and causes the latex to set.

This method is likely to be the more easily applied in practice and the remainder of the article is devoted to the more common form of such gelling agents. In the article in question there are two Figs. showing how the article may be impregnated and dried, and Fig. 3 illustrates the application of a heat sensitive latex compound, demonstrating the improved internal bond when using one of these compounds as the setting agent.

There is a table in the original giving mixes in which polyvinyl methyl ether is the setting agent, and here the coagulation temperature of latices may be controlled either by adjusting the stabilizer content or the *p*H of the compounded latex. A reduction in *p*H decreases the coagulation temperature and consequently decreases the storage life; an increase has the reverse effect.

Summary of Advantages of New Process

1. The internal bond is much improved. Fabrics can thus be coated, pressed, or used with adhesives with greater confidence.

2. There is an overall improvement in strength (*cf. Table 2 in original* which compares the properties of identical fabrics prepared with heat-sensitive and standard compounds).

3. The concentration of rubber binder on the surface of the fabric is reduced with a corresponding reduction of surface friction, giving the fabric a more pleasant handle.

4. The process facilitates the production of high rubber content handle, of interest in certain applications (*e.g.* in the shoe industry).

5. The calendering technique enables water to be squeezed out and drying time is thus reduced. In addition the resulting fabrics are more dense, and the handle is again enhanced.

Against these advantages is the much stricter control required during compounding and throughout the process.

This is a mere outline of a most interesting article and it will be appreciated that there are many more conditions which are mentioned in the original.

Note. — Amongst the agents mentioned is polypropylene glycol H.S. 35/40, and this glycol as a gelling agent for latex compounds is covered by a patent. Permission to use can be obtained from Oxirane Ltd. of Marlborough House, 15-17 Great Marlbrough Street, London, W.1.

Polyvinyl methyl ether may be obtained from Fine Dyestuffs and Chemicals Ltd., Calder Street, Manchester 2.

Post-war Synthetic Rubbers

Dr S. H. Morrell (RABRM) has contributed an article to *Research* on 'Synthetic Rubbers in the Post War World.' This presentation is written and illustrated in a most interesting fashion, and will give to the scientist who is not a rubber expert a very good idea of synthetic rubber progress. For comparison's sake he starts with Natural Rubber and Derivatives of NR, and proceeds with the Butadiene-Styrene Copolymers; then follow the Neoprenes and Hypalon, the Nitriles, the Thioplasts, Butyl, the Polyurethanes, the Silicones, and Acrylates, ending with Fluorinated Rubbers. As might have been expected Dr Morrell has produced a masterly review.

Ozone Cracking of Rubber

Continuing my survey of the *Twenty-first Annual Report* of the British Rubber Producers' Research Association, I must say a few words on *Ozone Cracking of Rubber* (p. 22). Detailed studies of the formation and growth of cracks caused by interaction of ozone with rubber, have resolved a number of perplexing features, and point to a mechanism for the protective action of anti-ozonants. Although ozone attacks rubber at even the smallest stresses, cracks only result if there is a local strain sufficiently large to result in separation of the severed ends of the fractured molecules. This flaw develops at flaws normally present in all surfaces where a critical value of stress is exceeded. Anti-ozonants serve to increase this critical stress, and appear to act by bridging the ends of broken molecular chains. At high stress when these broken ends are rapidly separated, protected samples fail just as readily as unprotected ones and once a crack starts to grow antiozonants afford little protection.

The difunctional antiozonants at present in commercial use suffer the disadvantage of 'staining.' This has stimulated a parallel study of the action of other substances which, while less effective antiozonants, are free from this defect.

Notes

Firestone Tire and Rubber Co. will be the first American rubber company to produce its own filament yarn for tyre cord. Purchase of property at Hopewell, Va., has been approved, and modernization of the existing plant is expected to start in mid-November. Initial production is scheduled for late in the summer of 1960. Other synthetic fibres may also be produced at this plant later. (*Rubber World*, October 1959, p. 7.)

The Future of Flexible Urethane Foams was a subject discussed by William O'Neill, president of General Tire and Rubber Co. of Akron (Ohio), on the occasion of his announcement of the company's new one-shot foam making system, which eliminates the prepolymer step in making some types of polyether foams. Mr O'Neill predicted that the sale of flexible polyurethane foams based on polyethers, will climb by 1964 to 200 million lb., that is four times the present production. He added that rigid foams based on polyethers will account for another 100 million lb. (*Rubber Age*, October 1959, p. 110.)

PHILIP SCHIDROWITZ

Questions Corner—94

(Second Series)

395. Name some of the liquid plastic materials that are used as protective coatings for tanks and other types of containers.

396. What plastic materials are used in the preparation of the many 'repair kits' now on the market?

397. What different methods are used for feeding material to an injection moulding machine?

398. What limitations are there in the use of cold curing epoxy based adhesives?

(Answers next week)

Answers to Questions Corner—93

391. For colouring polyester resins various pigments are now available, used in the form of pastes.

Some pigments retard the rate of curing but this can be remedied by increasing the amount of catalyst, although this naturally increases the cost of the mix.

Titanium dioxide pigments are useful and these may be extended with calcium carbonate and barium sulphate. Lithopones sometimes cause trouble with polyesters. Lamp black are used but tend to retard the cure.

For general work toluidine red is good and Prussian blue or phthalocyanine blue are both very good. Chrome greens and yellows are satisfactory.

Extenders are used to reduce the cost, assist in reducing the violence of the exotherm during cure and also to reduce the degree of shrinkage. Amongst the more popular materials are talc, silica, precipitated calcium carbonates, certain types of china clay, etc.

392. There are several types of modified urea formaldehyde resins which have been developed for wet strengthening paper, and these are in the form of a powder or a syrup in a solvent.

The efficiency of the resin depends somewhat on the different types of fibre. The amount of resin required will depend on this and also on the final degree of wet strength required. The highest efficiency is normally obtained with unbleached kraft.

Some paper makers prefer to add the solid resin direct to the beater and this is convenient for most grades of paper, and especially so for kraft paper.

As 'beating in' is generally detrimental to wet strength, the resin should be added at the end of the beating and given only sufficient stirring in the beater to secure adequate dispersion.

In some cases the resin is continuously added to the stock at the wet end of the machine. Where this is done, the resin may be conveniently made up to, say, a 25% solution in water.

Alum is essential to retention of most resins in bleached pulp. If, for some reason, this is not convenient, part of the alum may be replaced by hydrochloric acid for final adjustment of the *p*H. This is particularly recommended in the wet strengthening of unsized papers.

393. If sufficient heat can be generated by rubbing two plastic surfaces together this method may be used for bonding. It can be applied to all surfaces which can be rubbed against each other in a lathe, drill press or similar devices.

Friction welding has, of course, the advantage that it is simple in operation and quick, and the heat is sufficiently high to produce almost immediate surface welding while the material immediately under the surface is relatively unchanged. An additional advantage is that as air is practically eliminated from the rubbed surfaces, oxidation of the material is reduced to a minimum.

It must be borne in mind that the method is only applicable to joins of simple geometry and for products designed for mechanical bonding. There is also an undue amount of flash.

Friction welding is of advantage when dealing with materials that are sensitive to oxidation.

The weld strength will vary with the nature of the plastic, *e.g.*, in welding nylon the moisture content just prior to welding is very important. The weld strength is greatly increased by welding immediately after drying or immediately after moulding.

Freres (Mod. Plas. 1945, *23* (3) 142) compared friction welded joints and cement welded joints of polymethyl methacrylate. The former showed higher weld strength than the latter and the highest molecular weight type for a given acrylic resin appeared to be best for friction welding.

394. For welding piping the heated tool method is quite useful but for sizes over about 2in. it is desirable to have a jig to support and align the pipe during welding operations.

The type of connexion is dictated by the particular installation. Special fittings are available for the purpose. The ends of the pipe should be cut square or chamfered on the bore to avoid any restriction due to internal flash.

The two ends of the pipe are then heated by direct contact of a heated tool, or by using radiant heat a very short distance away from the ends, about $\frac{1}{16}$in. It should be noted that it is suggested that radiant heat increases the risks of oxidation of the surface of the material.

When the two ends are sufficiently heated, and in a molten condition, they are pushed together, rotated slightly to break any oxide film that might have developed, and allowed to cool while being held in position. There should be some flash, otherwise the strength of the joint will not be as good as is possible.

Heated tool welding can be carried out in the field if it is heated with acetylene torches.

Special techniques have been developed in which the heated tool, in the form of a wire or ribbon, remains in the final product as an integral part of the assembly.

(More questions next week)

Manmil Air Washer

An air washer with a capacity of 75,000 cfm has recently been manufactured and installed at the Stanlow refinery of Shell Oil Co. Ltd. The decision to make the washer in plastics was made by Manmil Plastics Ltd. in conjunction with G. N. Haden and Sons Ltd. in view of the high concentration of sulphur dioxide in the air and the need to recirculate the water.

The washer, of the double bank opposed spray type, is 14ft. wide and 14ft. high. Among the plastics employed are Epikote epoxy resins and Carlona high density polythene. There are also 600 nozzles made from nylon.

'Hancock's Pickle was something funny on the telly'

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MEN and MATTERS

A Review of People and Events

by George A. Greenwood

ONE of the rubber industry's best-known personalities, who has seen his company grow from a small organization importing tyres from North America with a small office in London, to become one of Britain's leading tyre manufacturers, has retired

W. E. DUCK

after 43 years' service. He is Mr William E. Duck, chairman and managing director of the Firestone Tyre and Rubber Co. Ltd.

Mr Duck joined the Firestone Tire and Rubber Co. in the United States in 1916. He became sales manager of their Baltimore Branch and Regional Sales Manager for Philadelphia shortly afterwards and was appointed general manager of Firestone in London in 1921. In 1923 he became managing director and in 1936 he was appointed chairman of the board. The big expansion of Firestone in the UK since his appointment as general manager and particularly during the last 20 years or so, has been due in great measure to the energy, wisdom and foresight of Mr Duck. I take this opportunity of wishing him a happy retirement.

Reinforced Plastics

The excellent attendance at last week's Bournemouth meeting of the British Plastics Federation's Reinforced Plastics Group must have proved considerably satisfying to Mr H. V. Blake (Fibreglass Ltd.). It was largely owing to his efforts that the Group was formed, and to his enthusiastic endeavours that membership of the Group has doubled during the past year. The meeting was off-the-record as far as factual reports were concerned, but it was clear from the animated discussion sessions which occupied most of the members' time, that more went there to learn than to contribute, although many had quite a lot to say about materials, methods of production and applications. The general reaction was that the experiment had been well worth while if only because it highlighted the technical problems facing users of reinforced plastics in many different fields.

Union Carbide Research

The appointment of Mr E. E. Griesser as manager of the Union Carbide Technical Service Laboratory, to be located in Geneva, Switzerland, has been announced. The new laboratory will be under the supervision of Union Carbide Europa S.A. which is located in Geneva and is an affiliate of Union Carbide Corporation. Mr Griesser graduated from Newark College of Engineering, Newark, New Jersey, USA, in 1950 with a B.Sc. degree in Chemical Engineering. In the same year he joined Union Carbide and was assigned to the Wire and Cable Materials Group at Union Carbide's laboratories in Bound Brook, New Jersey. In 1954 he received his M.S. degree in Chemical Engineering from Newark College. Mr Griesser was appointed project leader, extruder products, at the Bound Brook Laboratories and in 1957 was appointed head of the group.

E. E. GRIESSER

U.S.I.-International

A new company known as US Industrial Chemicals Co.-International has recently been formed. The company will provides sales assistance to European representatives handling U.S.I.'s petrothene polythene, as well as intensified technical service to European polythene processors. The company, officially incorporated as sales and development company of National Distillers and Chemical Corporation (International) S.A., will be known to the trade as U.S.I.-International. Temporary headquarters were opened in September at Kirchenstrasse 13, Zug 1, Switzerland. Permanent headquarters and laboratories will be constructed on land just purchased in Baar, Canton of Zug. Kenneth E. Cosslett, U.S.I.'s assistant export manager, has been named sales manager of U.S.I.-International, and Howard W. Woodham has been appointed manager of the technical service laboratory.

K. COSSLETT

H. WOODHAM

Novadel Appointment

Novadel Ltd. announce that Mr K. G. Hutchings has been appointed technical sales representative to the South of England. Mr Hutchings, who, I understand, has been associated with the paint industry for many years, has wide laboratory and plant experience of very recent developments within the industry, particularly in regard to polyester and high polymers.

He succeeds Mr George Sammonds, who has left the company to commence business on his own account.

K. G. HUTCHINGS

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Rubber Industry Safety Conference

ATTACK ON ACCIDENTS

ON the second day of the National Safety Conference held in London last month (see *RJIP* November 28), Mr R. Hillier, H.M. Superintending Inspector of Factories, gave a talk on the need for a systematic attack on non-technical accidents.

After quoting the number of reportable and non-reportable accidents, 185,000 total lost time accidents, Mr Hillier said that on last year's figures for all industry the chances of an employed man being killed were approximately one in 265. No complete frequency rate for industry as a whole was available and it was therefore not possible accurately to assess the average chance of employed persons meeting with a fatal accident. However, this could be done for the rubber industry. Last year 1,600 accidents were reported and there was a total of 1,760 lost time accidents. Of these, three were fatal, or one in 588. Hence an employed man has a one in 588 chance of being killed if he worked in the industry all his life.

Achievements

Mr Hillier then went on to examine what the Accident Prevention Committee of the NJIC of the Rubber Industry had achieved. The committee was formed in 1949 when the frequency rate (number of accidents per 100,000 man hours) was 1.57. The rate was now 1.00. The actual variation between firms was from 0.2 to 5.0. Many firms were above the 2.0. In his opinion, such firms were not playing their part. The solution, he said, was in the industry's hands. If they were determined to reduce the figure, it could be done. There was, in fact, no excuse for not doing so.

Men, said Mr Hillier, were naturally thoughtless. People did not always have their wits about them. If one imposed on a man's natural behaviour a highly mechanized age such as our own, and our present mode of life, what were the results? Unexpected things happened—accidents. There were, he thought, two ways of preventing such accidents. One was to change human nature; to ensure that people always had their wits about them; were never careless, never thoughtless, never indolent, never disobedient. It was highly unlikely that any success could come from such an approach.

An alternative was to learn to anticipate those unexpected things from past experience. That was where the study of previous occurrences, which the Accident Prevention Committee had been doing for ten years, was important. Technical accidents, said Mr Hillier, comprised 20% of the total in the industry. All of these had a technical solution and the solution in most cases had been found with some considerable success. The remainder, 80%, were non-technical accidents and efforts so far appeared to have made little or no impression on these.

Human Nature

This was perhaps because people had not fully appreciated the frailties of human nature. It was wrong to imagine that because a person was told to do a thing a certain way he would always do it that way. A certain standard of skill could be expected from every person but variations were tremendous.

There was every right to expect a standard of skill commensurate with the training of the individual. It should be remembered that men were often careless, and the degree of carelessness varied with the degree to which their minds were on the job. In turn this varied with the amount of interest in the job. Clearly, if safety were desired, training was essential.

On training, the speaker said that while firms went to considerable lengths to train persons to do production jobs there was all too often little thought given to training them to do the job safely. It was essential to train people to have a safety outlook as regards all their life in a factory, and this end would be achieved only if management set a proper example. Then, if all persons played their part success would result. Management must first ensure that the factory was safe. Then they must keep it safe, which necessitated constant supervision and constant inspection.

Mr Hillier then went on to outline some requirements. First, he said, management's outlook must be correct; they must be determined to have safety. Safety, he said, should not be the prerogative of one man, the safety officer. He was a specialist responsible to management. The only way was to get everybody to practice safety, eventually then newcomers would fit into the pattern. Initially, it was the management's job to make everyone understand the essential simplicity of safety precautions and that it was everyone's job. It was also imperative to provide avenues for immediate action to be taken when necessary; in other words, safety should be taken out of its watertight compartment.

Mr. Hillier then showed a very fine film made in the works of the Leyland and Birmingham Rubber Company and illustrating types of non-technical accidents and the remedies. The film, which was much applauded, was described as a fitting memorial to the work in the cause of safety of the late John Stopforth.

In the discussion which followed, Mr G. C. Lynch, Firestone Tyre and Rubber Co. Ltd., said that Firestone's frequency rate was 0.05. On non-technical accidents, especially in regard to firms with a frequency rate ranging between 1 and 5, he suggested that it was these in particular, constituting some 80% of accidents, that should be concentrated upon. If that were done the result would be that at the next conference the industry rate would have come down to 0.5.

Mr Hillier went on to say that films, including films made by private companies, were one of the most excellent methods of putting across safety education. Lists of films, both national and international, were available from the Royal Society for the Prevention of Accidents.

Cable Prices Up

Associated Electrical Industries have announced price increases of between 2½% and 7% on low voltage mains cables with effect from December 1. Notice that mains cable prices will shortly be raised has also been given by Pirelli-General. These increases follow the announcement last week by British Insulated Callender's Cables of increases of 7½% in the price of their mains cables (up to 22kV.).

Japanese SR Duties

The Japanese Government has begun talks with the Japanese rubber and petro-chemical manufacturing industries on a plan to impose custom duties on imports of synthetic rubber.

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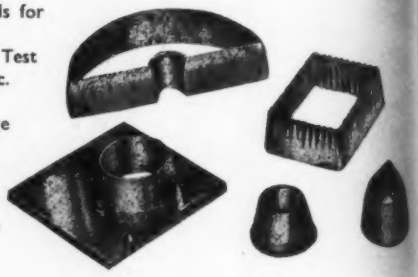

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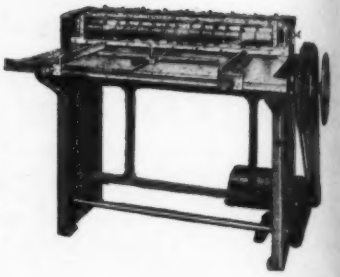

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FIFTH REPORT ON DUSSELDORF PLASTICS EXHIBITION

AMONG the many manufacturers of extrusion machines it was particularly interesting to visit the stand of Johann Fischer where considerable emphasis was given to various types of head to fit extruders. There was a particularly useful example of what is being done in this field in the form of a specially designed extrusion head (Fig. 1) which is for use for the double extrusion of film permitting different sizes and thicknesses of film to be produced at the same time. This head fits on a standard machine and each part can operate alone if need be. The extrusion takes place vertically upwards and requires a special take-off platform and gear. A new head for the vertical downward extrusion (Fig. 2) was shown for the first time at Düsseldorf.

Fig. 1. The Johann Fischer extrusion head for the upwards extrusion of film

One of the largest machines at the Exhibition was on show on the Becker and Van Hüllen stand. This press (Fig. 3) has been developed for use in the moulding of polyester resin reinforced glass fibre. Special design features have been incorporated in these presses particularly the large press tool area and the wide effective height to allow the moulding of high or tall components having a large surface area. Also the free movement is traversed at high speed whereas the moulding process itself takes place at a low speed in order to prevent the glass fibre inlay being damaged by too rapid a flow of the material and also to insure the exclusion of air bubbles. The pressure control can be effected by an automatic unit and the traversing speeds through both the idle and active range are automatically pre-selected.

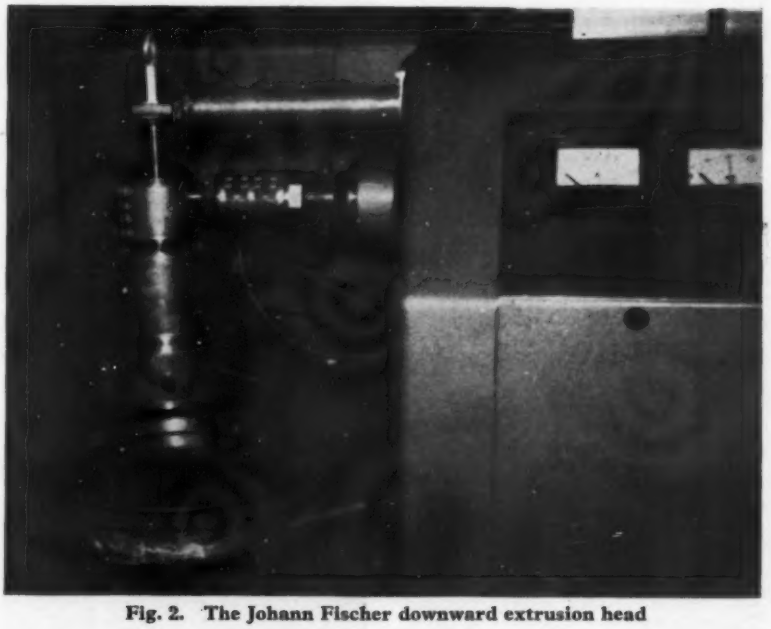


Fig. 2. The Johann Fischer downward extrusion head

To give some illustration of the range covered the statistics of three machines are quoted as follows: firstly the GPS 31.5 which has a pressure of 31.5 tons with a withdrawing pressure of 3.5 tons and a table size of 482 x 711mm. (approx. 19½ x 28in.) giving an effective daylight of 762mm. (30in.) and a stroke length of 300mm. (11.8in.) this being driven by 2.5kW. approximately. There is also the GPR 315 with a pressure of 315 tons and a withdrawing pressure of 35 tons; a table size of 1,980mm. x 1,397mm. (78in. x 55in.) with an effective daylight of 1,980mm. (78in.) and a 1,397mm. (55in.) stroke using 19.5kW. The third machine the GPS 800 has an effective pressure of 800 tons with a withdrawing pressure of 80 tons, a table size of 2,844 x 1,600mm. (102.4 x 63in.) with an effective daylight of 2,498mm. (approx. 98.4in.) and a 1,249mm. (approx. 49.2in.) stroke using 37kW. approximately.

Similar machines have been developed with different plate sizes but with the same pressure and a modification of the GPS 800 has a plate size of 2,000mm. x

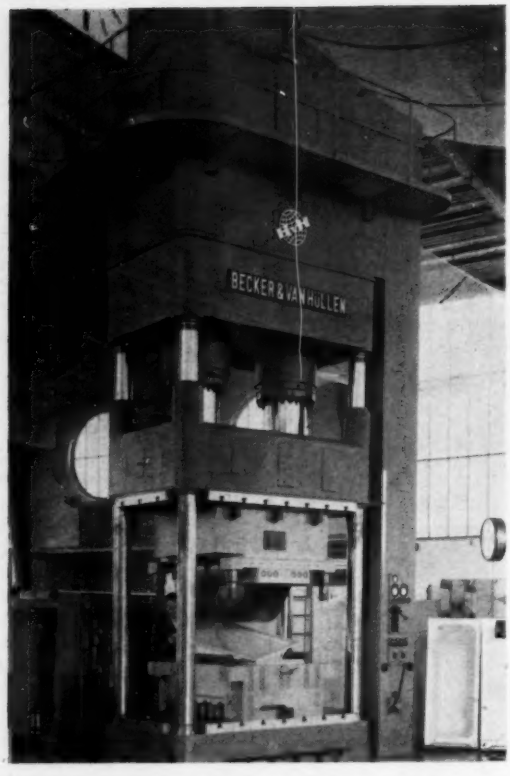


Fig. 3. The Becker and Van Hullen GPS 800 press for use in the moulding of polyester resin reinforced glass fibre

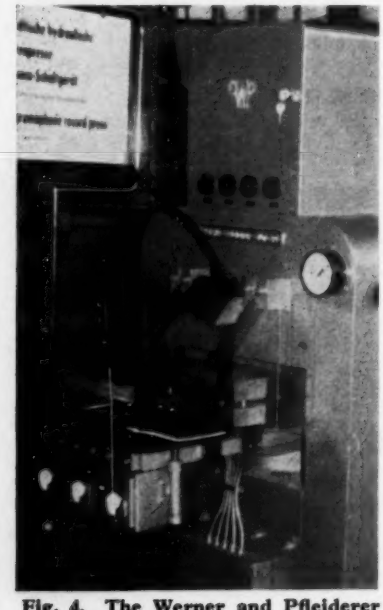


Fig. 4. The Werner and Pfleiderer press for the manufacture of LP records

3,000mm. (approx. 78.7 x 126in.), giving an effective daylight of 2,499mm. (98.4in.) and a stroke length of 1,249mm. (approx. 49.2in.) with 45kW. power being required. These presses are equipped with independent hydraulic drive and the high pressure piston pump is controlled by an efficient device which enables the ram to be driven at any speed between zero and maximum either with manual, semi- or fully-automatic control. The presses are available with a hydraulically operated sliding table which acts as a double table so that while one half is under the press the other half can be made ready.

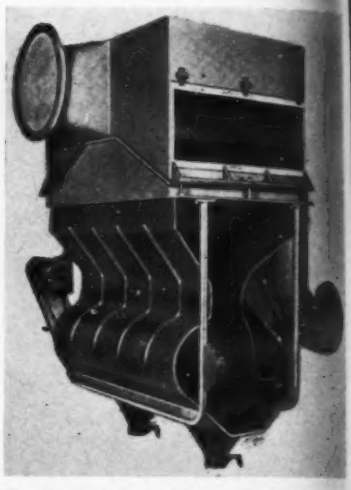
Again on the Werner and Pfleiderer stand there was an interesting example of a press (Fig. 4) for the manufacture of LP records incorporating a new control and timing box. This machine has a maximum 90 second

Fig. 6. Deutsche Steinzeugwarenfabrik straight-through PVC fan units

time cycle and can operate not only on thermoplastics but also on shellac.

Schnakenberg, Wuppertal-Barmen, showed something of what is being done in plastics fabrication, one of the main exhibits being a special corrosive dust extraction unit entirely of welded construction made from PVC and capable of handling 7,000 cubic metres per hour (Fig. 5).

The working drawing (Fig.) shows the system by which this unit



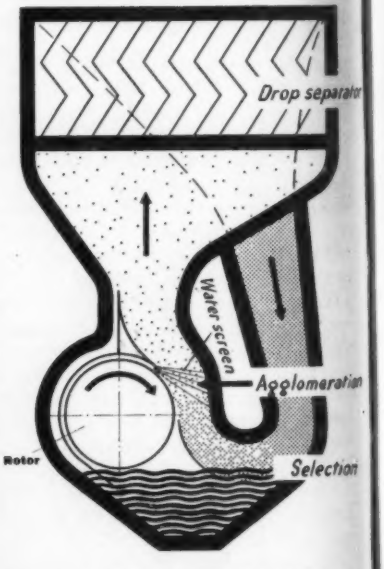


Fig. 5. The extraction unit for corrosive dust (*top*) is made entirely from rigid PVC. The working drawing (*below*) gives an indication of the complicated structures now possible in PVC

operates. This particular design is apparently used not only in cases of corrosive fume but also when non-corrosive dust fume is being extracted and the life of the unit made from plastic is very good and stands up effectively to the abrasive effect of these particles. This extraction unit is also made in 800m³, 1,200m³ and

Fig. 7. This fluidizing mixer combination, shown by Henschel, combines types FM 150 C/h and FM 150 C/k mixers. The plant is equipped with automatic sequence control

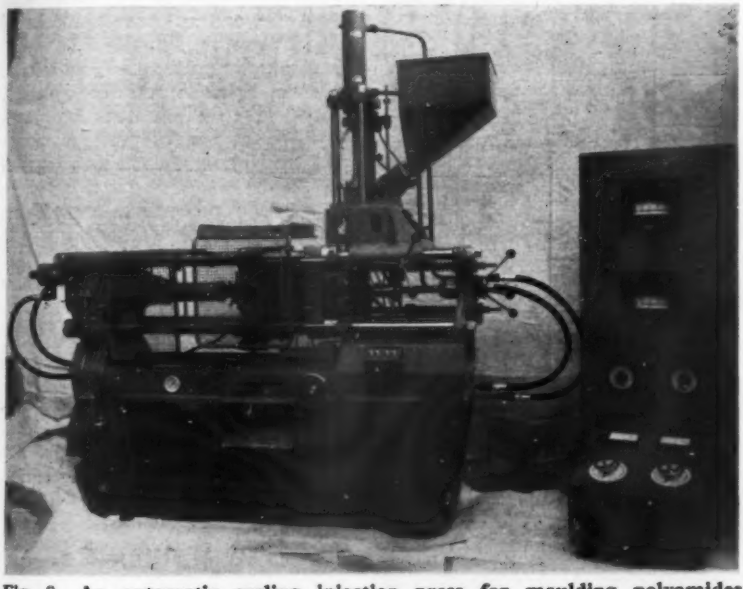


Fig. 8. An automatic cycling injection press for moulding polyamides shown by Manceau and Germain

2,000m³ capacities and is an interesting example of the complicated type of structure that can nowadays be effectively made from rigid PVC. Also shown on this stand was an experimental protective box for use with atomic materials also made from PVC with a clear PVC front inspection panel welded into position.

Also in the plastics engineering field was a range of PVC straight-through fan units by Deutsche Steinzeugwarenfabrik. The interesting point about these units is that the impeller is formed entirely from a single sheet and therefore must be stronger than if it were of welded construction. A number of sizes are made, the smallest being the T20 (background of Fig. 6). This unit which is approximately 203mm. (8in.) diameter handles between 100 and 500 cfm at 2,800 rpm using .125kW, the whole unit weighing approximately 6kg. The other unit (front of Fig. 6) is the T40 model and handles between 400 and 1,960 cfm at 1,400 rpm, using .22kW. or alternatively it handles between 840 and 4,000 cfm running at 2,800 rpm using 2kW. The largest fan of this type made is the T70 which is 711mm. (28in.) in diameter and handles between 960 and 7,500 cfm at 1,000 rpm, using 1kW. or alternatively between 1,140 and 11,940 cfm at 1,400 rpm using 3½kW. Naturally due to the design employed in this type of unit the water gauges are of necessity low and where larger water gauges are required the centrifugal type of PVC fan unit is recommended.

Shown for the first time at any exhibition was the interesting heater and cooler mixer combination of Henschel GmbH, Kassel (Fig. 7). This consists of two fluidizing mixers, the heating type FM 150 C/h and the cooling type FM 150 C/k mounted in a space-saving vertical arrangement. The mixers have respectively an oil-filled heating jacket (heating capacity 6kW.) with automatically-controlled temperature range of 60–200°C., and a cooling jacket with built-in water conduits. A two-speed motor is fitted and there is automatic sequence control for the entire working operation of feed, mixing at different speeds, discharge into the cooler mixer, cooling and final discharge of the treated material. Useful capacity of each mixer is 100 litres (approx. 22 gallons). Other sizes of fluidizing mixers manufactured by the company include a laboratory version with a capacity of 6 litres (approx. 1.3 gallons) and a 300 litre model.

An automatic cycling injection press, well suited for the moulding of polyamides, was displayed by Manceau and Germain, 62-64 Rue Stendhal, Paris 20 (Fig. 8). This neat and compact machine, which features vertical injection and horizontal closing (50 tons) has a maximum injection capacity of 60g. (approx. 2oz.), 10 injections per minute of 15g., and a plasticizing capacity of 10kg./hr. (22lb./hr.). Ejection can be centrally situated or to the side. Closing is hydromechanical by knee joint ram. Heating takes 3kW.

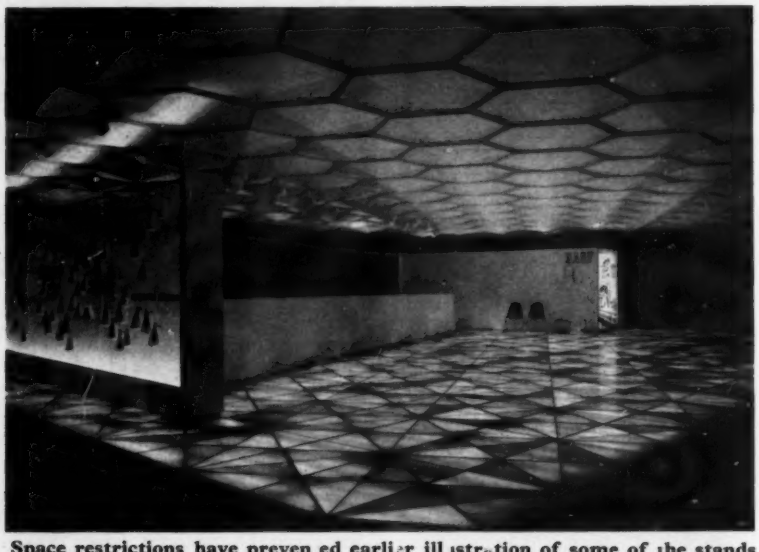
Mention was made in our issue of October 31 of the ingenious bottle blowing machine manufactured by Alpine AG of Augsburg. The output rate of small bottles was given as 70 an hour. This should, of course, be 700 an hour. The compact machine is self-contained and completely automatic.

Buchner Funnels

Goodburn Plastics Ltd., Arundel Road, Trading Estate, Uxbridge, who manufacture a wide range of plastics laboratory ware, have introduced a new type of Buchner funnel made from polythene.

The new funnel consists of two parts; the filter disc fits snugly into the lower part (funnel) and they can thus be separated quite easily for cleaning purposes. They are supplied in three sizes to fit filters of 11cm., 15cm., and 24cm. diameter, Types PBF1, PBF2 and PBF3.

Stands at Dusseldorf



Space restrictions have preven ed earlier illustration of some of the stands at the Dusseldorf plastics exhibition. Shown above are, from top downwards, the stands of Imperial Chemical Industries, Chemische Werke Huls and Badische Anilin- and Soda-Fabrik, which, in their different ways, achieved very high standards of display

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The Expanded Rubber Co. Ltd., Croydon, has received its largest ever individual order from Sweden. This is for three miles of Rubazote thermal insulation tubing, for use in the manufacture of deep-freeze display cabinets.

CANADIAN RUBBER

Consumption of natural, synthetic and reclaimed rubber in Canada during August showed a gain of 15.5% compared with corresponding period of last year. There was higher consumption for tyres and tubes, wire and cable, footwear and 'in other products.'

During August consumption of all kinds of rubber amounted to 16,291,000lb. compared to 14,100,000 a year ago. Natural rubber consumption rose to 6,628,000lb. from 5,452,000, synthetic to 7,682,000lb. from 6,766,000, and reclaimed to 1,981,000lb. from 1,882,000.

Amount of rubber consumed in the manufacture of tyres and tubes rose to 10,206,000lb. from 8,842,000, in wire and cable to 621,000lb. from 582,000, in footwear to 1,877,000lb. from 1,630,000 and in other products to 3,507,000lb. from 3,046,000.

At the end of August, stocks of natural rubber amounted to 3,746 long tons, compared to 3,169 tons at end of July. Stocks of synthetic amounted to 9,771 tons compared to 8,365 at end of previous month and reclaimed 1,848 tons against 1,848.

Domestic production of synthetic rose sharply in August amounting to 11,107 tons, compared to 9,217 month before. Reclaimed production amounted to 294 tons compared to 606 tons month before.

In the month of August, natural rubber accounted for 40.7% of all rubber used in Canada, compared to 38.6 year ago; synthetic for 47.2% compared to 48.0 year ago and synthetic for 12.1% against 13.3% year earlier.

New Rubber Co.

A new joint company to sell automotive and industrial rubber products in the European Common Market has been formed by the Dayton Rubber Company and NV Vereenigde Nederlandsche Rubberfabrieken (known as Hevea). The establishment of the new company was announced on December 1 in Dayton and at Arnhem, Netherlands, the headquarters for the overseas sales company which will be known as Dayton-Hevea. Hevea has been licensed to make the American company's line of products for sale in the Common Market. Mr Richard Rosenberg, manager of Dayton Rubber International, said these include raw-edge automotive V-belts, cog belts and vari-speed V-belts, flexible radiator and vacuum hose, printing and industrial rollers, foam latex and polyether foam.

Reinforced Plastics

DISCUSSION MEETING AT BOURNEMOUTH

FIRST of its kind and, by and large on results, a successful venture, was the discussion meeting held in Bournemouth on November 25-27 by the Reinforced Plastics Group of the British Plastics Federation. The meeting, under the chairmanship of Mr S. R. Badley, chairman of the Technical Committee, was attended by some 140 people. The occasion was made the more valuable by the presence of representatives from the Admiralty Materials Laboratory; the Admiralty, Bath; the Royal Aircraft Establishment; the Ministry of Transport and Civil Aviation and the Ministry of Aviation.

In his introductory remarks Mr H. V. Blake, chairman of the group, said that it was almost exactly a year since the reinforced plastics group was formed with a membership of about 30 companies. Membership was now about 60 companies, which meant that the group was now the third largest, in terms of numbers, within the Federation. Even so, there were still a lot of companies within the industry who were not yet members of the group. He estimated that there must be at least 1,500 moulders and fabricators of one sort or another, not, of course, all potential members.

Perhaps the most important outcome of the formation of the group had been the establishment of their own technical committee. Apart from the main committee, there were sub-committees dealing with structural design data; methods of tests; glass fibres; sink units; dough moulding compounds, and reinforced plastics lifeboats. Members of the main committee also sat on four BSI committees which were preparing specifications for resins, glass fibre reinforcements, and translucent sheeting.

It was, he thought, worth recording that the work being covered by these committees represented an attack on the problems of reinforced plastics specifications and properties that was unmatched in any other country in the world.

On the subject of the progress of the industry, Mr Blake said, there was no doubt that there had been a considerable increase in activity all over the world in reinforced plastics. So much so that there had been a shortage of raw material during the last few months—chiefly of glass fibre—but some indication of a possible resin shortage to follow.

The usage of glass reinforced plastics in Britain this year would be at least 10,000 tons representing about 25 million sq. ft. of moulded surface. About 10 million sq. ft. of translucent building panels were included in this figure. If material shortages did not continue to restrict expansion it seemed likely that these figures could be exceeded by at least 40% during 1960.

Glass fibre production gave some guide as to how the UK compared with other Western nations. The UK was the largest producer of glass reinforced plastics, outside the USA—which was ten times bigger. France was about 60% and Germany about 50% of UK production but both were growing fast.

Looking ahead, Mr Blake said it seemed that the most promising markets during 1960 would be building panels and fittings, land transport, boats' and ships' fittings and electrical boards and mouldings. Certainly a great leap forward could be anticipated next year.

One of the points that emerged most clearly from the conference was the need for closer collaboration within the industry between manufacturers and users of the materials, especially in terms of the collation of facts and figures. In turn this emphasized the importance of the work of the Group's sub-committee on structural data.

Subjects for discussion—although questions, answers and contributions ranged over wider fields—were as follows: 'Time, Load and Environment Effects on Strength,' opened by Mr H. Warburton Hall, Ministry of Aviation; 'Reinforcements and Their Effects,' opened by Mr L. Stevens, Fothergill and Harvey Ltd.; 'Applications, Surface Properties and Construction,' opened by Mr W. T. Nunn, Mendip (Chemical Engineering) Ltd., and 'Fire and Heat Resistance,' opened by Mr L. T. P. Whiteaway, Ministry of Transport and Civil Aviation. A 'Brains Trust' session, held on the final morning of the conference, was followed by a general summing-up by Mr Badley.

World Rubber Estimates

The International Rubber Study Group has revised estimates issued in May for natural and synthetic rubber requirements and supply during 1959. It is now estimated that the world may use 2,085,000 long tons of natural rubber and 1,527,000 long tons of synthetic, apart from synthetic produced in non-member countries. World production of natural is estimated at around 2,020,000 long tons. Annual production capacity of synthetic rubber in member countries, estimated last May at 2,040,000 long tons was still increasing. Actual production in 1959 had been fully up to the consumption rate.

The committee estimated that the 1959 requirements of the US would be 555,000 long tons of natural and 1,060,000 long tons of synthetic. The UK's requirements would be 179,000 long tons of natural and 79,000 long tons of synthetic.

New Directors

Bakker and Zoon, Ridderkirk, Holland, have announced that Mr A. D. Geervliet has resigned from the Board at his own request. New directors now appointed are Mr C. Touw and Mr L. J. G. Lindeboom. Mr Lindeboom is an Associate of the IRI.

Mr G. F. Plummer has been appointed Vice-President and General Manager of Dunlop Canada Ltd.

Krynac, the nitrile rubber manufactured by the Polymer Corporation Ltd., Sarnia, Canada, is being used by the Dunlop Rubber Co. Ltd. in the manufacture of 'Safetymaster' boots. In RJIP of November 21 1959 we omitted to state that Krynac is a product of the Polymer Corporation

Rubber Statistics

WESTERN GERMANY — SARAWAK AND NORTH BORNEO — SOLE CREPE

DETAILS have now been issued of the Western German rubber position up to the end of July last.

Imports of natural rubber during these months totalled 72,629 tons of crude and 7,606 tons of latex, or 80,235 tons in all, as against imports of 71,178 tons during the same period of last year, representing an increase of 12%. Malaya was the principal supplier of this rubber, with 37,925 tons, and was followed by Indonesia with 12,513 tons.

Consumption of natural rubber during these months totalled 80,529 tons, including 7,376 tons of latex and represented an increase of about 5,000 tons over the previous year. Stocks of natural rubber at the end of July stood at 11,653 tons of crude and 1,513 tons of latex.

Production of synthetic rubber in Western Germany during the period totalled 22,401 tons, nearly three times the previous year's figure of 8,277 tons. Imports of synthetic amounted to 19,101 tons, of which 14,360 tons came from the USA and 2,630 tons from Canada.

Sarawak and North Borneo

Details have now been made available by the Secretariat of the International Rubber Study Group of exports from these two territories for the third quarter of the year.

In the case of Sarawak, exports totalled 13,569 tons, bringing exports to the end of the third quarter to 32,018 tons. Singapore was the principal destination for these exports, taking 26,329 tons, while Japan took 4,110 tons and Hong Kong 1,283 tons. The remainder went to the UK (286 tons) and Belgium.

North Borneo's exports totalled 5,736 tons and brought the total for the first three quarters of the year to 16,476 tons. Of this amount, Japan took 5,569 tons, Singapore 4,731 tons and the United Kingdom 2,687 tons. Other countries to take appreciable quantities of this rubber included Western Germany (916 tons), Hong Kong (678 tons), the USA (585 tons), Italy, Spain and Canada.

Sole Crepe

The latest figures available for sole crepe exports bring the position for this commodity up to the end of September last.

Exports from Malaya during September amounted to 769 tons compared with exports of 625 tons in August and brought the total for the first nine months of the year to 4,836 tons, compared with the previous year's figure of 7,266 tons. Of the September exports, the UK took 282 tons, France 93 tons, Italy 68 tons, Spain 48 tons and the USSR 45 tons. None of this rubber went to either USA or China.

In the case of Ceylon, September exports amounted to 322 tons, compared with 105 tons in August, and brought the year's total to 859 tons, the comparable 1958 figure having been 858 tons. The UK took 38 tons of this rubber, while 150 tons went to Japan and 61 tons to Egypt.

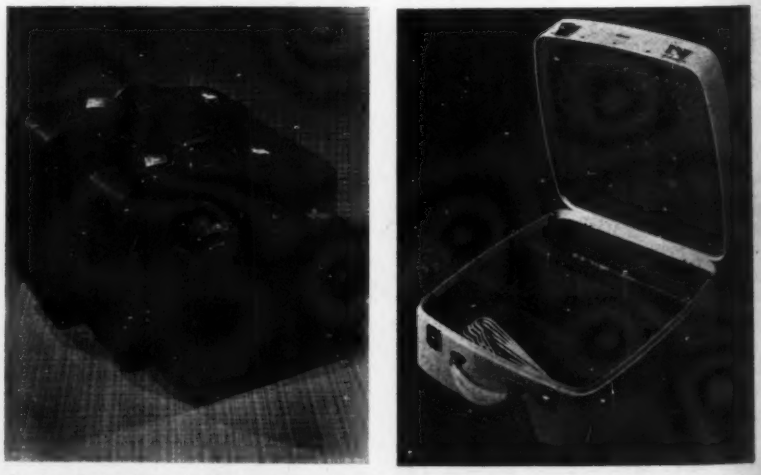
Vietnam's exports of sole crepe amounted to 148 tons in September and 90 tons in October, all of which went to France. Vietnam's exports so far this year have totalled 462 tons to the end of October.

Heat-activated Melinex film, spread with a heat-activated adhesive mass which is softened in the temperature range of 170°F. to 270°F., is being produced by Permacel Tapes Ltd., Slough. When laminated at these temperatures, this material gives exceptional clarity, protection from dirt, grease, chemicals, etc. Abrasive and ageing qualities are very high. This material is also available spread with a normal self-adhesive mass, eliminating the need for heating machinery. The company recommends these products for application to the book-covering and general bookbinding work.

IRI Golfing Society

SCOTTISH SECTION TAKES TROPHY FROM PIGS

THE last outing for the season, the match for the Cameron Cup and medal round for vice-captain's prize was played over the Ratho Park in excellent conditions. The result was a win for the West by 7½ matches to 2½. The vice-captain's prize was won by a guest, N. Paulin, with a net 66, followed one and two strokes behind by W. Johnston and J. M. Gallie. Five of the six who tied earlier in the season for the Challenge Cup took part in the medal round with W. Johnston, the eventual winner, followed by T. W. Davie, G. Wilson and P. W. Bell. W. Johnston also won the McElroy medal and prize with a total of 145 with J. M. Gallie three strokes behind. Earlier the second match took place between the Plastics Institute and IRIGS at Cathkin Braes and resulted in a tie five matches each, the section, however, having won the earlier match by the odd game took custody of the Dick Trophy for the first time. While congratulating Bill Alexander and the section, Mr Hibberd hoped that the result would be reversed next year. Mr Hibberd added that the trophy had been donated by the company as a tangible expression of appreciation of the efforts being made by the sections towards ever closer contacts between the industries, as exemplified in the number of united technical and social meetings held throughout the winter.—J. M. G.



Antler Ltd., Birmingham, have introduced a new range of luggage that is unusually light in weight. The cases have a covering of 'Plastoglass,' a vinyl material reinforced with glassfibre. Very tough and light, this material enables the customary seam stitching to be dispensed with, and a patented electronic welding process is used instead, resulting in a smooth, piped seam that is completely moisture proof. The 'Plastoglass' itself is fitted over strong, lightweight frames of laminated wood formed by a new production technique

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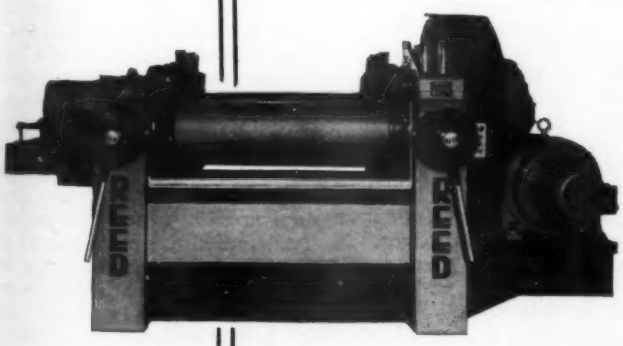

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PATENT SPECIFICATIONS

The following information is prepared from published Patent Specifications by permission of the Controller of H.M. Stationery Office. The full Specifications can be obtained from the Patent Office, 25 Southampton Buildings, W.C.2, at 3s. 6d. per copy (including postage).

Plastic Films and Sheets

No. 815,786. The B. F. Goodrich Co. Application and Filed, January 26 1956. Application in USA, February 23 1955. Published, July 1 1959.

Thin, water-resistant, vapour-permeable films, sheets and laminates having excellent 'hand' and 'slip' are prepared from compositions of PVC or like material containing a plasticizer, a minor amount of a softener for the PVC and a finely-divided, non-hygroscopic, pore-forming material. The softener and the pore-forming material are both soluble in a non-solvent for the PVC and the plasticizer, and the two former materials are removed with such a solvent from the fused or set PVC sheet to render the product permeable to vapour. Suitable materials for use as the softener are alkylene carbonates and polyalkylene glycols, while the pore-forming material may be a salt, such as common salt, water being a suitable solvent for extracting the softener and the salt from the PVC sheet.

The PVC sheet may be embossed either with designs or to simulate leather or woven material. It can be used as an upholstery material, for clothing and for footwear, and for any application where a vapour-permeable, water-resistant, plastic coating or film having a hard, glossy finish is required.

Golf Ball

No. 815,634. The Worthington Ball Co. Application and Filed, November 5 1956. Application in USA, September 7 1956. Published, July 1 1959.

A white cover for a golf ball, which does not need to be painted, consists essentially of balata, a white pigment, an antioxidant and a sun-proof material. Preferably the cover contains also natural rubber and a high-styrene-butadiene resin. In an example, the cover comprised balata 12 parts, natural rubber 4.2 parts, high styrene-butadiene resin 9.8 parts, together with an antioxidant, a sun-proof wax, titanium dioxide and vulcanizing ingredients.

Application of Flock to Rubber and Plastic Articles

No. 815,834. London Rubber Co. Ltd. Inventors: F. L. Davis and E. J. A. Davis. Application, October 3 1956. Filed, September 30 1957. Published, July 1 1959.

Articles of irregular shape, such as gloves, made of rubber or plastic, are provided with a flock surface by coating the articles with an adhesive, placing them in a chamber and then forming a cloud of flock in the chamber. The cloud of flock is produced by passing into the chamber air which has previously passed through a container in which flock is maintained in a state of agitation. The articles to be coated are carried on a conveyor which is operated intermittently to allow the articles to dwell in the flocking chamber. A very even coating of flock is applied to the surface of the articles and there is no appreciable waste of flock, as the flock which is not retained by the articles is recovered by drawing it into a duct connected to the floor of the chamber.

UK Belting in Canada

CANADIAN CLAIM DISPUTED

BRITISH manufacturers and exporters have disputed a claim by the Canadian rubber industry that it had lost export markets for rubber belts because of United Kingdom competition. Mr Gordon Blair of Ottawa, counsel for the Federation of British Rubber and Allied Manufacturers, suggested to the Tariff Board that any drop in exports was due to the refusal of British and American parent companies to direct export business to Canadian subsidiaries.

The Rubber Association of Canada is asking the board for increased protection against low-cost imports of rubber belts and belting from the United States, Britain, Japan, West Germany and Sweden. It proposes that the British preferential tariff be boosted to 20% from 7½, and that the most-favoured-nation rate be raised to 30% from 20%. A brief by the British Federation said British imports of belting are not hurting Canadian companies. Imports from the UK in 1958 totalled less than 4% of imports from all countries, with the US providing the bulk.

Mellowhide Products Ltd. announce that owing to expansion their head office has been transferred to larger premises at 26/28 Gt. Portland Street, London, W.1, as from December 1 1959. Their new telephone number is LANgham 9471/5.

REINFORCED PLASTICS AT ASTM

PLASTICS materials reinforced with glass fibre mats and fabrics are finding increasing use in structures, according to information presented at a Symposium on Reinforced Plastics during the ASTM 3rd Pacific Area National Meeting in San Francisco recently. The problems of defining the properties of these materials for military applications were no less acute today than were similar problems of specifying war materials in the day of the longbow. H. A. Perry of the Naval Ordnance Laboratory, speaking at the reinforced plastics symposium, pointed out that a supplier of seasoned wood for longbows for a medieval army might be deprived of his head if the quality of the product were found inferior. While such drastic methods of quality control were in little use today, there were difficult problems of describing and evaluating the properties of reinforced plastics for procurement purposes.

Pointing to one application where reinforced plastics were proving their worth, George Epstein, of Aerojet General, described a test cell for measuring permeability of reinforced plastics to gases at pressures as high as several thousand psi and at high temperatures. This test was applied to filament-wound pressure vessels in which failure in the test was caused by progressive gas permeation with successive delamination of the plies during cycling and relaxation of adjacent plies.

Present ASTM methods for evaluating mechanical properties of plastics had not been found satisfactory for determining properties of filament-wound reinforced plastics. William McCarthy of The Brunswick-Balke-Collender Company told the symposium that he had devised some modified mechanical tests especially adapted to specimens cut from filament-wound reinforced plastics. He described tests and presented data on methods for tensile, compressive, and flexural strength as well as a bearing test and several different varieties of shear. A special shape proposed by Mr McCarthy for evaluating filament-wound materials was a cylinder from which both circular ring specimens and straight specimens were cut. By testing these two types of specimens Mr McCarthy was able to obtain mechanical property values in both the hoopwise and lengthwise directions corresponding to the principal directions of loading in a radome or similar structure.

Synthetic Rubber Prices

Prices of synthetic rubbers appear regularly in RUBBER JOURNAL AND INTERNATIONAL PLASTICS *in the first week of each month. It will be appreciated if suppliers will give notification of any price changes or additions to their range. C.i.f. duty paid quotations are subject to slight variation due to exchange, ocean freight and insurance fluctuations. Prices are in pence per lb., except where otherwise stated.*

(c-qdp)—Ex-quay duty paid (cifUKdp)—cif UK duty paid (ddp)—Delivered duty paid (e-sUK)—Ex-store UK (ex-wUK)—Ex-warehouse UK (d)—Delivered BM—black masterbatch CBM—cold, black masterbatch CNP—cold, non-pigmented CNS—cold, non-staining COE—cold, oil extended COELC—cold, oil extended, light coloured CO/BM—cold, oil/black masterbatch CPOE—cold, pigmented, oil extended CRE—cold, rosin extended dw—Dry weight HN—high nitrile HNP—high nitrile, powder HP—hot, pigmented HS—high styrene LMW—low molecular weight MHN—medium high nitrile MLN—medium low nitrile MMW—medium molecular weight MN—medium nitrile NS—non-staining

SBR TYPES AND HIGH-STYRENE RUBBER

Ameripol (Goodrich Gulf) (min., 70,000-lb. lots)	(c-qdp)
1000 Hot, Non-Oil	23.10
1001 ,, ,,	23.10
1002 ,, ,,	23.34
1006 ,, ,,	23.34
1007 ,, ,,	23.34
1009 ,, ,,	23.71
1011 ,, ,,	23.71
1012 ,, ,,	23.24
1013 ,, ,,	23.94
1500 Cold, Non-Oil	23.10
1501 ,, ,,	23.10
1502 ,, ,,	23.10
1703 COE, 25% oil	*20.31
1705 ,, ,, ,,	*20.07
1707 ,, 37.5% ,,	*18.89
1708 ,, ,, ,,	*18.89
1710 ,, ,, ,,	*18.66
1712 ,, ,, ,,	*18.66

*Under 70,000 lb., min. 600 lb.

ASRC (American Synthetic Rubber Corpn.) (carloads lots of 30,000 lb.)	(cifUKdp*)
1000 Hot, Non-Oil	23.99
1001 ,, ,,	23.99
1004 ,, ,,	23.99
1006 ,, ,,	23.99
1009 ,, ,,	24.61
1018 ,, ,,	26.74
1019 ,, ,,	26.26
1500 Cold, Non-Oil	23.99
1502 ,, ,,	23.99
1503 ,, ,,	26.02
3110 ,, ,,	25.78
1703 COE	20.69
1708 ,,	19.27

*US/£ conversion rate $2.80

Cariflex (Shell Chemical Company)	(e-sUK)
S-1000 Hot	22.0
S-1002 ,,	23.375
S-1006 ,,	22.0
S-1009 ,,	24.0
S-1011 ,,	24.0
S-1013 ,,	24.0
S-1100 Hot/black	19.75
S-1500 Cold	22.0
S-1502 ,,	22.0
S-1509 ,,	22.0
S-1600 Cold/black	19.625
S-1602 ,, ,,	19.625
S-1605 ,, ,,	19.375
S-1703 COE	20.25
S-1707 ,,	17.75
S-1709 ,,	17.5
S-1712 ,,	17.5
S-1803 COBM	17.875

Copo (Copolymer)	(cifUKdp)
1006 Hot, Non-Oil	23.25
1500 Cold, ,,	23.25
1502 ,, ,,	23.25
1505 ,, ,,	26.00
1712 COE	18.50
1778 ,,	18.75
3900 CRE	23.125

FR-S (Firestone)	(cifUKdp*)
1000 Hot	23.187
1001 ,,	23.187
1004 ,,	23.187
1006 ,,	23.187
1500 Cold	23.187
1502 ,,	23.187
146 ,,	23.187
1703 Oil-Extended	20.125
1712 ,,	18.5
123 ,,	19.187
155 ,,	18.5
173 ,,	20.125
178 ,,	18.75
1009 Specialty	24.625
1010 ,,	25.812
1012 ,,	24.187
1013 ,,	24.875
1014 ,,	27.75
1015 ,,	28.75
141 ,,	28.625
158 ,,	29.562

*US/£ conversion rate $2.80

International Synthetic Rubber Co.	(ex-wks)
Intol 1500	22
Intol 1502	22
Intol 1710	17.5
Intol 1712	17.5

Philprene (Phillips)	(c-qdp*)
1000 HNP	23.28
1001 ,,	23.28
1006 ,,	23.28
1009 ,,	24.69
1010 ,,	25.86
1018 ,,	26.80
1019 ,,	26.33
1100 HP	19.65
1104 ,,	19.28
1500 CNP	23.28
1502 ,,	23.28
1503 ,,	26.10
1601 CP	19.56
1605 ,,	19.28
1703 COE	20.23
1706 ,,	19.94
1708 ,,	18.82
1712 ,,	18.58
1803 CPOE	17.78
1805 ,,	15.99

*US/£ conversion rate $2.81¼

Plioflex (Goodyear)	(fasUSport US cents per lb.)
1006 HNP	23.25
1500 CNP	23.25
1502 ,,	23.25
1703 COE	20.00
1710 ,,	18.25
1712 ,,	18.25
1713 ,,	16.9
1714 ,,	16.65
1773 COELC	20.00
1778 ,,	18.5

Polysar (Polymer UK)	(e-sUK)
S Hot	22
S-630 Hot	22
Kryflex 200 Cold	23.5
Krylene	22
Krylene NS/CNS	22
Krynol 651 COE	17.5
Krynol 652 ,,	17.75
S-X 371 Process Aid	24

Synpol (Texas-US Chemical Company)	(cifUKdp)
1000 Hot, Non-Oil	23.10
1001 ,, ,,	23.10
1002 ,, ,,	23.34
1006 ,, ,,	23.20
1007 ,, ,,	23.20
1009 ,, ,,	23.71
1012 ,, ,,	23.24
1061 ,, ,,	23.10
X-274	25.32
8000	23.94
1500 Cold, Non-Oil	23.10
1502 ,, ,,	23.10
1551 ,, ,,	23.10
1703 COE	20.13
1707 ,,	18.71
1708 ,,	18.71
1711 ,,	18.62
1712 ,,	18.48
8200 ,,	18.71
8201 ,,	17.20
8150 CBM	19.46
8253 COBM	16.20
8254 ,,	15.83
8256 ,,	16.33

US/£ conversion rate $2.80

SBR LATICES

Copo (Copolymer) (10-ton lots)	(cifUKdp)
2101 (dw)	46.30
X-765 ,,	40.80
X-800 ,,	37.20
2102 ,,	38.00
2105 ,,	38.00
2110 ,,	38.00

Naugatex (Naugatuck Chemical International)	(ex-wUK)
2000	39
2001	39
2002	39.5
2006	43
2105	40
2107	40
2108	40
2711	39
2714	39
2733	39
2740	43

Pliolite Rubber (Goodyear)	(d)
2000	40

Latex	
2001 (dw)	40
2104 ,,	40
2105 ,,	40
2108 ,,	40
5350 ,,	40

Pliolite Resin (Goodyear)	(d)
101A (dw)	44
150 ,,	50
151 ,,	35
160 ,,	50
170 ,,	50

Hycar (B. F. Goodrich)	(ddp)
2507 (HS) dw	48

Polysar (Polymer UK)	(e-sUK)
Latex, type IV	32.5
Latex, type 722	28.75 to 31.75

International Synthetic Rubber Co.	(ex-wks)
Intol Latex R23	22
Intol Latex M23	22

ACRYLONITRILE TYPES

Butaprene N (Firestone)	(cifUKdp)
NL	52.5
NAA	56.25
NF	51.5
NXM	60.18

Chemigum	(e-s)
N—1	75
N—3A	52
N—5	52
N—6G	45
N—7	45
N—8	45
N600X	45

Hycar (British Geon) (500-lb. lots and over)	(UKd)
1001 High Nitrile Hot	52
1041 ,, Cold	52
1002 MHN Hot	45
1042 ,, Cold	45

Hycar (B. F. Goodrich) (500-lb. lots and over)	(ddp)
1411 HNP	66
1432 MHN (crumb)	64
1072 ,, (carboxyl)	66
1312 ,, (liquid)	55
1043 MLN	51
1014 Low Nitrile	61

I.C.I. (min., 5-cwt. lots)	(UKd)
Butakon A-4051 HN Cold	52
Butakon A-3051 MN Cold	45
Butakon A-3002 ,, ,,	45

Paracril (US Rubber)	(e-sUK)
18-80 Low Nitrile	63
AJ ,, ,,	50
B MLN	51
BJ ,,	51
BLT ,, Cold	51
BJLT ,, ,,	51
C MHN	59
CLT ,, Cold	59
CV ,, (crumb)	60
D High Nitrile	67
ALT	51

Polysar (Polymer UK)	(d)
Krynac 800 MN	45
Krynac 802 LN	45
Krynac 803 MN (low Mooney)	45
Krynac 801 HN	52

ACRYLONITRILE LATICES

Butaprene N (Firestone)	(cifUKdp)
N-300 (dw)	53
N-400 ,,	60.5

Chemigum Latex (Goodyear)	(d)
200 (dw)	65
235 CHS ,,	60
236 ,,	60
245 B ,,	52
245 CHS ,,	52
246 ,,	52
247 ,,	52
248 ,,	52

Hycar (B. F. Goodrich) (dry weight, drum lots)	(ddp)
1551 High Nitrile	66
1552 MHN	57

Hycar (British Geon) (dry weight, 3 drums and over)	(UKd)
1561 High Nitrile	60
1571 ,, ,, (carboxyl)	60
1562 MHN	52
1577 ,, (modified)	52

ACRYLIC TYPES

Hycar (B. F. Goodrich)	(ddp)
4021 Slab, 500 lb. and over	144
4501 Latex, dry weight	96

BUTYL TYPES

Esso	(e sUK)
Regular 035	21.75
Regular 150	21.75
Regular 215	21.75
Regular 217	21.75
Regular 218	21.75
Regular 325	21.75
Non-staining 065	22.75
Non-staining 165	22.75
Non-staining 265	22.75
Non-staining 267	22.75
Non-staining 268	22.75
Non-staining 365	22.75

Vistanex (Polyisobutylene)	(c-qdp)
MS LMW	54
MH ,,	54
L-80 MMW	54
L-100 ,,	54
L-120 ,,	54
L-140 ,,	54

Polysar (Polymer UK)	(e-sUK)
Butyl 100	21.75
Butyl 200	21.75
Butyl 300	21.75
Butyl 301 NS	21.75
Butyl 400	21.75
Butyl 101 NS	26.25
Butyl 402	22.5

Hycar (B. F. Goodrich) (500 lb. and over)	(ddp)
2202 Brominated	68

NEOPRENES

	(e-qdp)
W and WHV (dwdel)	42.62
WRT ,,	48.37
WX ,,	44.62
GN ,,	44.62
GNA ,,	44.62
GRT and S ,,	45.62
AC ,,	57.125
KNR ,,	75.62
AC 'M' and 'S' ,,	57.125
CG ,,	57.125
AD ,,	57.125

Latices—Dry (per lb. del, min., 50 lb.)	
571	49.75
842A	49.75
572	51.25
601A	51.87
650	54.125
735	51.25
736	51.25
950	58.25
60	51.87
750	51.25
635	53.62

SILASTOMER

Midland Silicones (500-lb. lots del)	
Stocks	16s. 6d. to 35s.
Pastes	26s. to 35s.
Gums and base stock	36s. to 42s.
Cold-curing silicone rubber	20s. and 23s. 6d.

REINFORCING RESINS AND RUBBERS

I.C.I. (min., 2-ton lots)	(UKd)
Butakon S-8551	36.5
Butakon S-7001	33.5

Hycar (B. F. Goodrich)	(ddp)
2007 (powder)	42.5

Pliolite (Goodyear)	(d)
S—6B	36.5

Polysar (Polymer UK)	(e-sUK)
SS-250 HS (bale)	27.25
SS-250 ,, (flake)	27.5
Kryflex 252 HS	25.5

Cyclite (Durham Raw Materials)	42

HYPALON

In 50-lb. bags del UK	71.62

Rubber Markets

LONDON

As usual the London rubber market has continued to reflect trends in the East and over the week prices have again moved toward lower levels. There has at times been a certain amount of demand for lower grade rubber which came mainly from the Continent but with the Communist bloc countries still out of the market prices have drifted lower with only an occasional rally at times. There is a further decline of a halfpenny in the Spot position while the fall is greater in the case of some distant forward positions.

Latest prices are as follows:

No. 1 RSS Spot: 35d.-35½d.

Settlement House:

January 33⅞d.-34⅛d.

February 33½d.-33⅝d.

March 32⅝d.-32⅞d.

January/March 33½d.-33⅝d.

April/June 32d.-32¼d.

July/September 31d.-31¼d.

October/December 30¼d.-30½d.

Cif basis ports:

December 34⅜d.-35d.

January 34¼d.-34½d.

Godown:

December 119¼ (Straits cents) nominal.

LATEX

Centrifuged latex per gallon in drums, December shipment 21s. 3d., January 22s. 3d., February 22s., cif European ports. Spot, 21s. 9d., January 22s. Bulk, nominal 21s. 4d. Creamed, seller, December, 20s. 10d. Normal, seller, 15s. 9d.—December/January.

AMSTERDAM

The Amsterdam rubber market ruled as under on November 30:

	Guilders per kilo	
No. 1 RMA	Nov. 30	Previous
December	3.40	3.40
January	3.26½	3.29
February	3.26	3.29
March	3.26	3.29
January/March ..	3.27	3.29
April	3.04½	3.07

Sales: 30 Tendency: Easy

BANGKOK

No. 1 RSS

The price for No. 1 RSS, at Bangkok on November 30 was 37 (37) US cents per lb.

SINGAPORE

The opening was slightly lower on overseas advices on November 30, but after small business prices declined further on lack of interest in thin dealings. Lower sheet was neglected. The afternoon market was quiet. There was some interest in lowers until shortly before the close when heavy up-country godown liquidation and near selling forced prices down to about four cents below the noon level. The turnover was fair but as buyers were continually backing away, prices dropped further towards the end of the day.

	Malayan cents per lb., fob Malayan ports to open ports	
	Close	Previous Close
No. 1 RSS, Dec.	118½–118¾	123½–124
Jan.	116½–116¾	120½–120¾
No. 2 RSS, Dec.	117½–118	122½–123½
No. 3 RSS, Dec.	115 –116½	120 –121½
No. 4 RSS, Dec.	113 –114	116½–118½
No. 5 RSS, Dec.	109 –111	112 –114
No. 1 RSS, Spot	122 –125	128½–131½
No. 3 blanket, thick remilled, December ..	111½–113½	114 –116
No. 1 fine pale crepe, Dec. ..	132½–134½	136 –138
2x Thin brown crepe, Dec. ..	112 –113	114 –115

Tone: Easier

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums fob at 212.80d. per gallon.

CEYLON

No. 1 RSS

The price for No. 1 RSS Spot, at Colombo on November 30 was 136¾ (145) Ceylon cents per lb.

NEW YORK

The New York rubber market ruled as under on November 30:

DEALERS' PRICES

	Ex-dock, US cents per lb.	
	Nov. 30	Previous
No. 1 RSS, Dec. ..	41½b–42a	42½n
Jan. ..	40½b–41a	41½n
No. 2 RSS, Dec. ..	41½b–41¾a	42½n
Jan. ..	40½b–40¾a	41½n
No. 3 RSS, Dec. ..	41b –41¼a	42n
Jan. ..	40b –40½a	41n
No. 1 RSS, Spot ..	41½b–42a	42½n
No. 3 amber blanket crepe, Feb. ..	38¾n	39n
No. 1 latex, thin crepe, Dec. ..	43n	44n
No. 1 latex, thick crepe, Dec. ..	43½n	44½n

FUTURES—REX CONTRACT

	US cents per lb.	
	Close	Prev. Close
Jan. ..	40.55t	41.59–41.58t
March ..	38.60t	39.35t
May ..	37.65t	38.25b–38.40a
July ..	36.75t	37.25b–37.50a
Sept. ..	36.40b–36.60a	37.00b–37.30a
Nov. ..	36.00b–36.25a	36.50b–36.75a
Jan. ..	35.60b–35.85a	36.00b–36.25a

Sales: 91 Tone: Steady decline

Rubber futures were easier on November 30, declining by more than half a cent per lb. on liquidation following the decline abroad. Trading was moderately active. Traders said that the US Government was selling a substantial amount of the barter rubber from its holdings at two cents below the market price which was helping to ease the market. They said that the GSA selling had been an important factor in the January position easing from the recent high of 45 cents a lb. The barter rubber is said to be comparable in grade to No. 3 sheets and any three ambers, and desirable for factories since spot and December delivery of these grades is scarce. Physicals were quiet. Factories were buying little and only limited shipment offers were reported. In the closing stage, the decline of futures was pared somewhat on covering.

DJAKARTA

Three tons of sheet No. 1 were transacted at 57.30 rupiahs and 11 tons of sheet No. 3 at 54.50 on November 30. The market closed uncertain.

	Rupiahs per kilo	
	Nov. 30	Previous
Spot No. 1 Priok ..	55.00b	53.00b
Spot No. 2 Priok ..	54.00b	52.00b
Spot No. 3 Priok ..	53.00b	51.00b
No. 1 fine pale crepe, spot	49.00b	47.00b

Tone: Uncertain

macroPlastic 1960

Plans are going ahead for the second International Plastics Exhibition 'macroPlastic,' which will be held on the Croeselaan exhibition site at Utrecht from October 19 to 26 1960.

Members of the working committee are representative of the plastics industries and come from the Plastics Research Institute TNO and from the Netherlands' Technical Services. These members are Dr C. R. J. Besseling, Ned. Verkoopkantoor voor Chemische Producten NV, Amsterdam; Mr E. J. Hamers. Netherlands Association of Plastic Products Manufacturers, The Hague; Ir C. J. Jaski, Chemical Products Department of Shell Nederland NV, The Hague; and Mr J. van der Ven of the Plastics Research Institute TNO, Delft.

The 290,000 sq. ft. exhibition area will be nearly twice as large as the 'macroPlastic' exhibition held in Amsterdam in 1957.

Mr Norman Daniel, assistant general manager of Semtex Ltd., and Mr George Vaughan, works manager of their factory at Brynmawr in South Wales, have been appointed to the Semtex board. Mr Daniel, who is 48, joined Semtex in August this year. He had previously had wide industrial experience in India and Australia, as well as the UK. Mr Vaughan (50) joined Dunlop in 1928. He was works manager of the Dunlop tennis racket factory at Waltham Abbey from 1952 until 1955, and has been works manager at Brynmawr since that date.

Industry INTELLIGENCE

Technical Data

Butanox

Butanox consists of technical methyl ethyl ketone peroxide dissolved in phthalate plasticizer, the standard Butanox (also termed Butanox M.50) being a 50% solution. Butanox is used principally as a catalyst for the polymerization of unsaturated polyester resins and this application of Butanox, together with information on its properties, form the subject of a bulletin issued by Novadel Ltd., Lucidol Products Division, St. Ann's Crescent, London, S.W.18.

When Butanox is used as a catalyst for the polymerization of unsaturated polyester resins, an accelerator is added for polymerization between room temperature and 50°C., but above this temperature accelerator should not be added. The most suitable accelerator is cobalt in the form of octoate dissolved in white spirit, plasticizer or monostyrene (NL-53, NL-51 and NL-49 respectively). Polymerization of polyester resins is an exothermic reaction, and data are presented in the form of graphs showing the temperature rise with time for two general purpose polyester resins during polymerization with different concentrations of Butanox and cobalt accelerator. Data are also given for the gel times of three unsaturated polyester resins with different concentrations of Butanox and cobalt accelerator. The best procedure in the use of this catalyst is to form a two-part mixture, one comprising Butanox and half the resin and the other comprising the accelerator and the other half of the resin, the two parts being mixed together immediately before use. Butanox is toxic and notes on the health hazard of this catalyst are included in the bulletin.

Calcium Silicates in Resin-Rubber Compounds

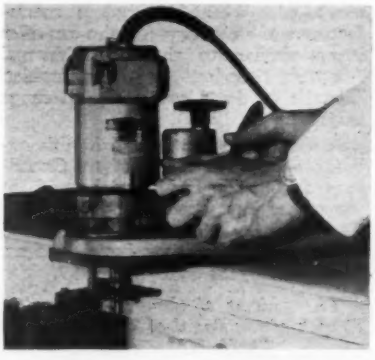
An investigation of the effect of two calcium silicates—Microcal 160 and Microcal 210—in resin-rubber compounds is reported in Progress Report No. 4, issued by Joseph Crosfield and Sons Ltd., Warrington, Lancs. Three resin-rubber compounds were used, based on natural rubber (NR) and a high-styrene resin (HSR) containing approximately 50% styrene, in the following proportions: (a) NR 40, HSR 100; (b) NR 70, HSR 70; (c) NR 100, HSR 40. A fourth compound (d) contained NR only and was included for comparison. Each of the compounds (a), (b) and (c) were compounded with three proportions of Microcal 160 and Microcal 210, namely 90, 100 and 110 parts per 140 parts of rubber plus resin. Compound (d) was compounded with 84, 112 and 126 parts of each of the Microcals per 140 parts of rubber, corresponding to 60, 80 and 90 phr.

Data are given for the following properties of the vulcanizates of all the compounds: Tensile strength, elongation at break, modulus, tear strength, hardness, compression set and tension set. The data show that at a given proportion of HSR to NR, increasing loadings of the Microcals produce progressively harder, stiffer materials with some loss of tensile strength and elongation. These effects are broadly similar to those produced by a lower loading of Microcal in a compound of higher resin content. It is stated in the report that there is evidence to show that, by judicious use of the Microcals, less high styrene resin may be used to impart desired property levels, with the advantage, in general, of superior permanent set values.

Machines, Materials and Equipment

Taylor-Hobson Pantograph Machines

Taylor, Taylor and Hobson Ltd., Leicester (a division of Rank Precision Industries Ltd.) have announced a completely new range of pantograph machines for letter cutting and profiling. The new machines form a logical range in specification and price to meet present and future trends of requirement, from a portable bench type to a



large-capacity, floor-pedestal machine. The model 'A' bench pantograph machine is capable of 1 to 1 copying as well as reductions down to 16 to 1. The copy-holder and copy letters are interchangeable with those on all other Taylor-Hobson machines. The cutter spindle linkage is of robust design, housing the spindle drive motor and a very compact drive to the spindle. The whole head can be raised 4in. (101mm.) from table level to accommodate thick work. A generous work-table 16 x 8in. (406 x 203mm.) with four tee slots is provided, together with two work-holding clamps. The model 'D' pantograph machine is a floor-pedestal unit capable of 1 to 1 copying as well as reductions down to 16 to 1. An area 9 x 4½in. (230 x 115mm.) can be covered at 1 to 1. The motor is of ample power, and eight spindle speeds are provided ranging from 2,730 to 18,000 rpm. The model 'JH' engraver miller is a larger capacity pantograph machine of rugged design with pre-loaded ball bearing joints to the pantograph and linkage.

The pantograph is designed to be compact and also have a large coverage—for example, a rectangle 14½ by 7½in. (362 by 181mm.) at 1 to 1 and corresponding reductions down to 50 to 1. To match this large coverage, large capacity copyholders are available. The model 'JR' copying, profiling, routing and milling machine fills a need for a modest-priced vertical milling machine designed for faithfully and quickly reproducing any number of further pieces from an existing piece or template by a hand-controlled 3 to 1 lever mechanism guiding the template around a stylus simultaneously guiding the work-piece around the cutter.

Mixing Valve for Washrooms

The supply of water to showers and washrooms by hot and cold mixing valves introduces a degree of danger if there is a risk of failure of the cold supply. To obviate this danger, a manually-operated mixing valve, noted in the DSIR *Technical Digest*, has been introduced by Meynell and Sons Ltd., Montrose Street, Wolverhampton, which incorporates an automatic protective device. The normal opening sequence is shut-cold-tepid-hot, but if at any stage the cold supply should fail, there will be a complete cut-off. There is also provision to limit the maximum temperature at which water can be delivered. Action of the valve depends on the maintenance of approximately equal heads of water, of at least 4ft., of both hot and cold supplies; it is not intended for direct connexion to a mains water supply.

New Publications

Griffin and George Price List

Griffin and George Ltd., the laboratory furnishers, have completed distribution of their current price list of laboratory chemicals, and all those customers in education, industry and industrial research who are on the group's mailing list should have received their copy. The catalogue comprises 84 pages of general chemicals, AnalaR and micro-analytical (MAR) reagents, and many pages devoted to microscopical stains, reagents for water analysis and other specialized items.

Future Events

INSTITUTION OF THE RUBBER INDUSTRY

Burton-on-Trent Section.—Monday December 7 at the Midland Hotel, Burton-on-Trent, at 7.30 p.m. 'Direct Vulcanization of Rubber-Soled Footwear,' by F. Baynes (Dunlop Footwear Ltd.).

Merseyside Section. — The meeting due to be held on December 7 has now been *cancelled.*

North-Eastern Section. — Monday December 7 at the Eldon Grill, Grey Street, Newcastle, at 7 p.m. 'Protection of Chemical Plant,' by L. Crompton (Dunlop Rubber Co. Ltd.).

London Section.—Tuesday December 8 at the Royal Society of Tropical Medicine and Hygiene, 26 Portland Place, London, W.1, at 7 p.m. Panel Discussion 'Natural Rubber v. SBR.' Panel—Dr L. Bateman (BRPRA), Mr K. G. Burridge, M.A., M.Ch.E., A.R.I.C., A.M.I.Chem.E. (International Synthetic Rubber Co. Ltd.), Mr H. E. Davis, F.I.R.I. (Dunlop Rubber Co. Ltd.), Mr W. G. G. Kellett, M.Sc. (RGA), and Mr K. T. Pickard, A.I.R.I. (Polymer (UK) Ltd.). Preceded by a 5.30 meeting—'Uses of Rubber in the Aircraft Industry' by Mr P. I. Brittain, B.Sc. (De Havilland Aircraft Co. Ltd.).

Southern Section.—Wednesday December 9 at the Polygon Hotel, Southampton, at 7.30 p.m. 'Some Aspects of the Compounding of Styrene-Butadiene Synthetic Rubbers' by Mr R. B. Moore (Monsanto Chemicals Ltd.).

South Wales and Monmouthshire Section.—Joint meeting with the Plastics Institute, Wednesday December 9 at the Queen's Hotel, Newport, at 7.30 p.m. 'Molecular Structure and Properties of Plastics and Rubbers,' by Dr A. W. Birley (I.C.I. Ltd.).

West of England Section.—Wednesday December 9 at the Melksham House, Melksham, at 7.45 p.m. 'Recent Developments in Soviet Rubber Science and Industry' by Mr R. J. Moseley, A.L.A., A.I.L. (RABRM).

Leicester Section.—Friday December 11 at the Bell Hotel, Leicester, at 7.30 p.m. 'The Utilization of Man-Made Fibres in the Rubber Industry,' by Mr G. A. Pittman (Courtaulds Ltd.).

Manchester Section.—Monday December 14 at the Engineers' Club, Manchester, at 6.45 p.m. 'Stress-Relation Measurements in the Investigation of Ageing of Vulcanizates,' by Dr J. Scanlan (RABRM).

Midland Section.—Monday December 14 at the James Watt Institute, Birmingham, at 6.45 p.m. 'The Ageing and Weathering of Rubber and Some Plastics,' by Dr W. McG. Morgan (Monsanto Chemicals Ltd.).

Preston Section.—Monday December 14 at the BTR Industries Social Club, Farington, Preston, at 7.15 p.m. 'Education in Industry,' by Mr R. F. Marshall, B.Sc., A.M.I.Mech.E. (Metropolitan-Vickers Electrical Co. Ltd.).

PLASTICS INSTITUTE

North-Eastern Section.—Wednesday December 16 in the Second Dining Room of the Eldon Grill, Grey Street, Newcastle, at 7 p.m. Film evening.

Scottish Section.—Tuesday December 15 at the North British Hotel, Edinburgh, at 7.30 p.m. 'The Colouring of Rubber,' by C. Musgrave (The Geigy Co. Ltd.). Joint meeting with the Scottish Section, IRI.

South Wales and Monmouthshire Section.—Wednesday December 9 at the Queen's Hotel, Newport, at 7 for 7.30 p.m. 'Molecular Structure and the Properties of Plastics and Rubbers,' by A. W. Birley, Ph.D. (I.C.I. Ltd.).

Yorkshire Section.—Wednesday December 16 at St. Mark's House, 186 Woodside Lane, Leeds 2, at 7.15 p.m. 'Electrical Heating for the Plastics Industry,' by A. Westerman, B.Sc., Ph.D., A.Inst.P., F.I. Ceramics (Geo. Bray and Co. Ltd.).

Export Opportunities

Plastics Pipe Fittings and Steel Adapters for Canada

Mr H. J. Sewell, manager of Grandview Industries Ltd., 840 Bradford Street, St. James, Manitoba, has told the UK Trade Commissioner at Winnipeg that his firm are anxious to get in touch with UK manufacturers of plastics pipe fittings similar to those shown in a pamphlet which is available for inspection in Room 620 at the branch. Further copies of the pamphlet are available for immediate loan in order of receipt of applications. The Canadian concern would also like to get in touch with United Kingdom manufacturers of steel adapters who can offer items similar to the 12in. Venturi Adapters described in the pamphlet. Lengths of the adapters should range from 3in. to 12in.

Manufacturers interested in this enquiry should write direct to Grandview Industries Ltd., and should, at the same time, notify the UK Trade Commissioner, 403-504 Main Street, Winnipeg 2, that they have done so. B.o.T reference: ESB/23889/59.

The address of the Export Services Branch of the Board of Trade is Lacon House, Theobalds Road, London, W.C.1. Telephone number: Chancery 4411, extensions 776 or 866.

Witco Chemical Co. Ltd. announce that as from December 1 1959 Mr R. Shacklady, C.A., has joined their board as joint managing director. Mr C. C. Hallett, the present managing director, will continue in this post until his retirement in August 1962.

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.

MECHTRICAL (775,205) For devices of rubber or plastics, being goods for use by insertion into pipes to inhibit the bursting of such pipes due to freezing of their contents. By Mechtrical Sales Ltd., Manor Royal, Crawley, Sussex. (Class 17; September 23 1959.)

MARLEY (B765,299) For flooring materials and wall tiles, none being of metal. By the Marley Tile Co. Ltd., London Road, Riverhead, Sevenoaks, Kent. To be associated with No. B549,669 (2943, 1092) and others. (Class 19; September 23 1959.)

TEXON (762,823) For materials in the form of sheets or rolls made from fibrous materials impregnated with resin and included in Class 17; and insulating materials and gaskets (packings). By Texon Inc., Canal Street, South Hadley Falls, State of Massachusetts, USA. Address for service is c/o Haseltine, Lake and Co., 28 Southampton Buildings, Chancery Lane, London, S.W.1. (Class 17; September 23 1959.)

ERINOID (789,781) For plastics in the form of pastes, powders, liquids, emulsions, dispersions and granulates, all for industrial use. By Erinoid Ltd., Lightpill Mills, Stroud, Gloucestershire. To be associated with No. 445,599 (2408, 1171) and another. (Class 1; September 23 1959.)

MYON (776,486) For soles and heels; and tips and protectors for soles and heels; all for footwear. By The Sussex Rubber Co. Ltd., School Road, Willesden, London, N.W.10. To be associated with No. 776,485 (4230, 877). (By Consent.) (Class 25; September 23 1959.)

RUBBATEX (779,215) For rubber buckets, rubber plant pots, rubber dustbins, and rubber dustbin lids. By S. and J. H. Swinnerton Ltd., Derby Works, Manchester Road, Bury, Lancashire. To be associated with No. 779,214 (4230, 878). (Class 21; September 23 1959.)

POLPROTEK (790,034) For drums and the like containers, all having linings of plastics and included in Class 6. By Todd Bros. (St. Helens and Widnes) Ltd., Ditton Road, Widnes, Lancashire. (Class 6; September 23 1959.)

MYON (776,485) for material in sheet form made predominantly of rubber, of composition rubber, of synthetic rubber, of synthetic resin plastics or of combinations of two or more of the aforesaid materials; and articles made therefrom; all being goods included in Class 17. By The Sussex Rubber Co. Ltd., School Road, Willesden, London, N.W.10. To be associated with No. 776,486 (4230, 882). Class 17; September 23 1959.)

CARAVAN (786,715) For imitation leather in sheet form made of plastics. By Elias Khedoori, trading as Anglo-Orient Manufacturing Co., 50 Whitworth Street, Manchester, 1. January 30 1959. (Class 18; September 23 1959.)

MANPOR (789,292) For expanded polystyrene plastics for use as insulating material. By Commerce Factors (G.B.) Ltd., Torpoint, Cornwall. (Class 17; September 23 1959.)

ERINOID (789,783) For plastics included in Class 17, in the form of sheets, blocks rods and tubes, all for use in manufacture. By Erinoid Ltd., Lightpill Mills, Stroud, Gloucestershire. To be associated with No. 445,599 (2408, 1171) and another. (Class 17; September 23 1959.)

DEVERITE (788,228) For polystyrene plastics included in Class 17 in the form of sheets, strips, slabs, rods, tubes and shaped sections. By Nivek (Steel Stockholders) Ltd., Westminster Bank Chambers, 329 High Holborn, London, W.C.1. (Class 17; September 23 1959.)

LASTEX (780,242) For yarns and threads, all made wholly or principally of rubber or of artificial rubber. By Lastex Yarn and Lactron Thread Ltd., Fort Dunlop, Holly Lane, Erdington, Birmingham. To be associated with No. 526,820 (2813, 2789) and others. (Class 17; September 23 1959.)

NEW COMPANIES

Dock Tyre Co. Ltd. (639,771).—October 16. Capital: £5,000 in £1 shares. To carry on the business of manufacturers of and dealers in tyres of all kinds, etc. The permanent directors are: Mrs Blanche M. France and Harry France, both of 104 Birley Moor Road, Frecheville, Sheffield, 12, and Peter A. France, 10 Sharrand Grove, Sheffield, 12.

Elland Bridge Dyeing Co. Ltd. (640,964).—November 2. Capital: £100 in £1 shares. To carry on the business of dyers and finishers of all classes of textile and plastic goods, dry cleaners, etc. The directors are: John W. Peet and Mrs Martha M. E. Peet, both of 19 St. Albans Road, Halifax. Regd. office: Old Lane Dyeworks, Old Lane, Halifax.

John Kay and Graham (Plastics) Ltd. (641,131).—November 3. Capital: £3.000 in £1 shares. To carry on the business of manufacturers of and dealers in plastic and other bags, boxes, sacks, portmanteaux, trunks, suit and attaché cases, etc. The directors are: Ewart G. Leon, Pike's Farm, Crowhurst, Lingfield, Iain Duncan, [illegible] Drive, Rutherglen, Scotland, Albert W. Day and Edwin Thos. B. Rose. Regd. office: 11 Parsons Green, London, S.W.6.

Bansplan Ltd. (640.951).—November 2. Capital: £100 in £1 shares. To carry on the business of manufacturers of and dealers in plastics, modelling and moulding materials, etc. The first directors are to be appointed by the subscribers.

Strong Plastics Ltd. (641,095).—November 3. Capital: £100 in £1 shares. To carry on the business of manufacturers of plastics, machinery of all kinds, moulders and fabricators of and dealers in plastic substances and goods, etc. Bernard Strong is the first director. Regd. office: 3/4 Clements Inn, Strand, W.C.2.

Andrews Plastics Ltd. (641,817). — November 12. Capital: £15,000 in £1 shares (7,500 'A' and 7,500 'B'). To carry on the business of manufacturers and producers of all kinds of plastics, etc. The directors are: Geoffrey F. Andrews, George C. Andrews, Mitchell M. Segal and Walter M. Espovich. Regd. office: 21 Muspole Street, Norwich.

Tyre Services (Hexham) Ltd. (641,165).—November 3. Capital: £100 in £1 shares. The directors are: John Blacklock and Winifred Blacklock, both of 58 Scotby Road, Scotby, Carlisle. Regd. office: Durranhill Industrial Estate, Carlisle.

Jayar Walbrook Holdings Ltd. (640,927). October 30. Capital: £100 in £1 shares. To carry on the business of distributors, importers, exporters and general agents in synthetic rubber, plastics, chemical, rubber and allied materials, etc. The first directors are not named. Regd. office: 23 Lawrence Lane, E.C.2.

COUNTY COURT JUDGMENTS

NOTE.—*These Judgments which are supplied from the Registry of County Court Judgments, Lord Chancellor's Department, 3 Dean's Yard, London, S.W.1, are not necessarily for debt, and some may have since been satisfied. They may be for damages or otherwise, they may relate to actions bona fide contested between the parties, or they may be against defendants liable in a representative capacity and not personally; but no distinction is made on the register. A judgment does not imply inability to pay. Judgments are not returned to the Registry as satisfied in Court Books within twenty-one days.*

HENRY WILLIAM POPE, 8 Hindrey Place, Clarence Road, London, E.5, Rubber and Timber Merchant. Shoreditch, £39 12s., March 19 1959. Taxation of costs, April 20 1959.

POLYTHENE CENTRE, 318 Munster Road, Fulham, London, S.W.6. Skipton. £14 5s. 4d., May 6 1959.

RUBBER AND ASBESTOS FLOORINGS LTD., Bridge End Chambers, 3 Bridge End, Leeds, 1. Leeds, £29 17s. 2d., April 9 1959.

ROCKS PLASTIC FOAM CO. LTD., 17 London Road, East Grinstead, Sussex. East Grinstead, £30 13s. 1d., April 20 1959.

PATENT LIST

Printed copies of the Specifications in the following list, published by permission of the Controller of H.M. Stationery Office, can be obtained from the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d., including postage, but about six weeks after the date of this publication will usually elapse before they come available. Orders with remittance may be sent in advance to the Patent Office, and will be fulfilled immediately the Specifications are published.

COMPLETE SPECIFICATIONS ACCEPTED

Open to public inspection on September 16 1959

British Rubber Producers' Research Association. Derivatives of natural or synthetic rubber or of gutta percha and the manufacture thereof. 820,261.

British Rubber Producers' Research Association. Rubber derivatives and the manufacture thereof. 820,262.

K. Ziegler. Process for the polymerization of ethylene. 820,263.

B. F. Goodrich Co. Glass fibres and the products thereof. 820,276.

General Electric Co. Irradiated filler-containing polythene. 820,168.

E. 1. Du Pont de Nemours and Co. Process for modifying the structure and properties of addition polymers. 820,120.

T.I. (Group Services) Ltd. Method of lining pipes and vessels with polymer plastics. 820,121.

B. F. Goodrich Co. Rubber compositions and in antioxidants therefor. 820,170.

Kodak Ltd. Light-sensitive linear polymers. 820,173.

Monsanto Chemicals Ltd. Extrusion machine and process. 820,325.

Standard Machinery Co. Extrusion apparatus for rubber and other plastic materials. 820,221.

British Tyre and Rubber Co. Ltd., F. H. Sampson and J. F. Blackshaw. Connections for flexible piping or tubing. 820,341.

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